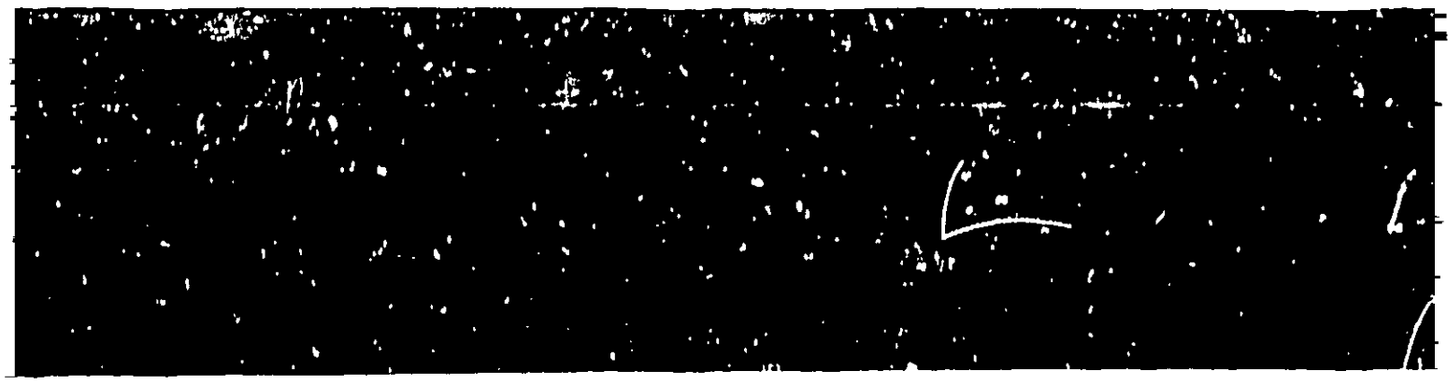
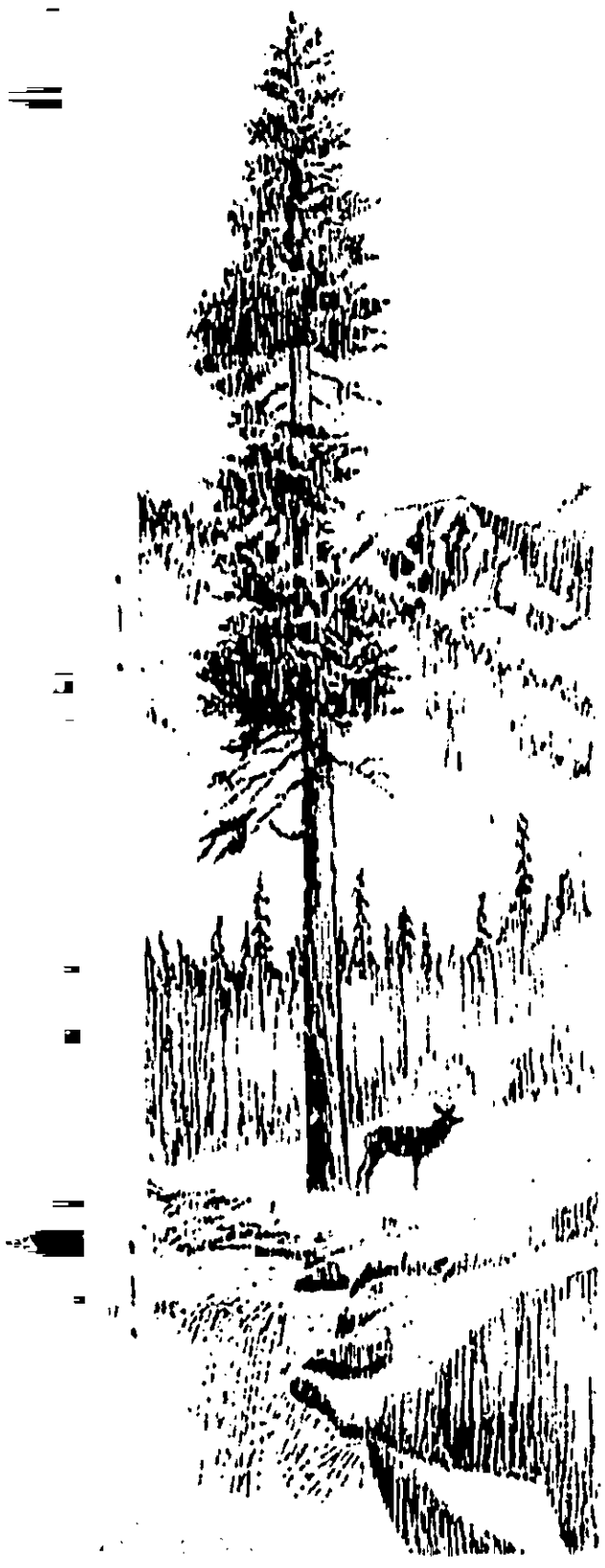


A08708



College of Forestry, Wildlife
and Range Sciences

IDAHO COOPERATIVE
WILDLIFE RESEARCH UNIT
SEMI-ANNUAL REPORT

JULY 1, 1978 - DECEMBER 31, 1978

Forest, Wildlife and Range
Experiment Station

University
of Idaho

VOLUME 3 NUMBER 2

SEMI-ANNUAL REPORT

IDAHO COOPERATIVE WILDLIFE RESEARCH UNIT

July-December 1978

NOT FOR PUBLICATION

This report lists the objectives, procedures, and findings of all current research being conducted under the supervision of the Idaho Cooperative Wildlife Research Unit. The data reported herein are preliminary and may be inconclusive. Permission to publish any of the contents of this report in any form is therefore withheld pending specific authorization from the Unit.

Respectfully submitted,

Maurice G. Hornocker
Unit Leader

Elwood G. Bizeau
Assistant Unit Leader

Table of Contents

*Abstract or summary of Final Report

COOPERATING AGENCIES:

Idaho Department of Fish and Game
University of Idaho
U.S. Fish and Wildlife Service
Wildlife Management Institute

COORDINATING COMMITTEE:

John H. Ehrenreich, Dean, College of Forestry, Wildlife and Range Sciences, University of Idaho
Joseph C. Greenley, Director, Idaho Department of Fish and Game
Maurice G. Hornocker, U.S. Fish and Wildlife Service

UNIT STAFF:

Maurice G. Hornocker, Unit Leader, U.S. Fish and Wildlife Service, Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho

Elwood G. Bizeau, Assistant Unit Leader, U.S. Fish and Wildlife Service, Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho

Esther L. Beymer, Unit Secretary

Roderick C. Drewien, Research Wildlife Biologist, College of Forestry, Wildlife and Range Sciences, University of Idaho

Edward O. Garton, Assistant Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho

Wini Kessler. Assistant Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho

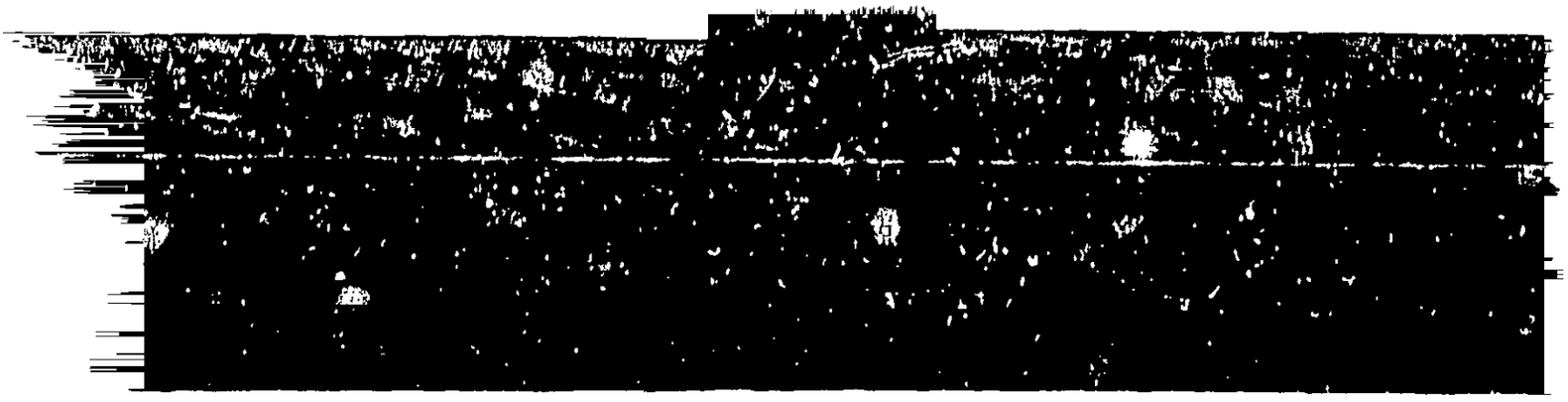
Lewis A. Nelson, Associate Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho

John P. Messick, Research Associate, College of Forestry, Wildlife and Range Sciences, University of Idaho

James M. Peek, Professor of Wildlife Management, College of of Forestry, Wildlife and Range Sciences. University of Idaho

Steven R. Peterson, Assistant Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho

Graduate Students	Degree Objective	Project Support
Ray P. Bosch	M.S.	U.S. Forest Service FWR Experiment Station U. of I. Research Council
Gordon D. Bunch	M.S.	Personal
Evelyn Bull	Ph.D.	U.S. Forest Service
Dinah J. Demers	M.S.	FWR Experiment Station
Richard D. Greer	M.S.	Personal
Harry R. Jageman	M.S.	U.S. Forest Service
John F. Marshall	M.S.	Personal
Wayne E. Melquist	Ph.D.	U.S. Fish and Wildlife Service
Glen Mendel	M.S.	Personal
Joe E. Miles	M.S.	Idaho Dept. of Fish and Game
Thomas E. Owens	M.S.	McIntire-Stennis
D. John Pierce	M.S.	U. S. Forest Service
Donna E. Rounds	M.S.	Personal
Lawrence D. Roy	Ph.D.	Alberta Dept. of Agriculture
Gayle M. Sitter	M.S.	U.S. Bureau of Land Management
Michael C. Todd	M.S.	U.S. Bureau of Reclamation
Nancy M. Warren	M.S.	Nature Conservancy
Jack S. Whitman	M.S.	U.S. Fish and Wildlife Service
Jeff Yeo	M.S.	Idaho Dept. of Fish and Game



Project WU-103C: The Effects of Rest-Rotation Grazing System Upon Wildlife Populations Inhabiting the East Fork of Salmon River, Idaho

Investigator: Jeff Yeo

Summer Assistant: Jennifer Cox

Advisor: James M. Peek

Project Support: Idaho Department of Fish and Game; U.S. Forest Service

Objectives:

1. Describe range use patterns for mule deer, elk, and cattle.
2. Determine food habits for mule deer, elk, and cattle by availability of forage.
3. Relate 1 and 2 to cover type, plant phenology, range condition, pasture within the system, and season of use.
4. Outline the population dynamics for mule deer and elk.
5. Quantify the vegetation changes brought about by the grazing system.
6. Determine if forage or land use competition exists between mule deer, elk, and cattle within the grazing system.

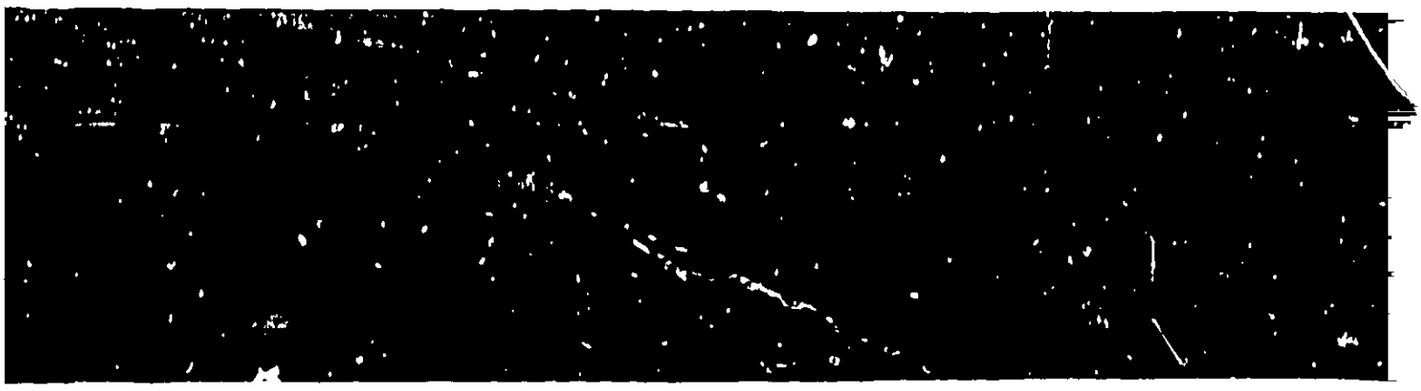
Progress:

Range Distribution

Fifteen fixed-winged flights. one helicopter flight, and numerous vehicle and foot observations were used to obtain range distribution data.

Range use data for cattle for the period 16 June-31 October (when cattle were removed from the system) are based on 193 observations of 4525 animals. Elevations used varied little, predominantly within 7000-9000 feet. Habitats utilized included *Artemesia tridentata vaseyana/Agropyron spicatum/Poa sandbergii* (V/A/P), *Artemesia tridentata vaseyana/ Agropyron spicatum/Festuca idahoensis* (V/A/F), *Artemesia tridentata vaseyana/Festuca idahoensis*(V/F), *Artemesia triparita*, and Riparian communities. Generally, cattle used areas with no appreciable aspect (open benches and draws), but when on slopes, use of northerly aspects predominated.

Fifty-one observations of 625 elk showed elevational use averaging somewhat higher than cattle; 8000-9200 feet. V/A/F was the most heavily used cover type; V/A/P, V/F, Riparian, and *Pseudotsuga menziesii* types received lesser use.



During the July-December period 171 deer were observed 53 times. The V/A/P type and to a lesser extent the V/A/F type were used at elevations of 7800-8000 feet. A change to use of riparian areas, aspen and willow stringers occurred during August-October with appreciable variability in elevations used (range: 5800-9000 feet). No particular aspects were used predominantly. In November and December, a shift to higher elevations (8800 feet in November, 7600-8200 feet in December) coincided with a shift to V/A/P and V/A/F sites. This change probably reflects summering deer movement to winter ranges within the study area.

Food Habits

Deer, elk, and cattle food habits are summarized by taxa in Table 1.

Deer used forbs almost exclusively during August and September; *Medicago sativa*, *Penstemon* spp., *Achillea millefolium*, and *Lupinus* spp. predominantly. Shrubs, however, became prominent foods in the remaining three months. *Rosa woodsii*, *Artemesia tridentata* var. *vaseyana*, *Chrysothamnus viscidiflorus*, *C. nauseosus*, *Atriplex confertifolia*, and *A. spinosa* were the major species utilized. Forbs such as *Astragalus filipes* and *Lupinus* spp. were eaten to a lesser extent.

Elk foods in August were split between forbs and sedges; *Taraxacum officinale* and *Carex* spp. mainly. From September through December, shrubs figured somewhat in the diet, with *Chrysothamnus viscidiflorus* and *Artemesia tridentata* var. *vaseyana* the most used shrubs. Only in November were forbs used to any extent, the important forb being *Lupinus* spp. Grasses figured heavily in the diet throughout the six month period. Prominent grasses and grass-like plants included: *Agropyron spicatum*, *Festuca idahoensis*, and *Carex* spp.

Cattle feeding sites were examined until the end of October when cattle were removed from the study area. During this period, grasses occupied 95-100% of the diet. Grasses and sedges eaten included: *Agropyron spicatum*, *Elymus cinereus*, *Festuca idahoensis*, *Koeleria cristata*, *Poa sandbergii*, *Poa* spp., *Stipa comata*, and *Carex* spp.

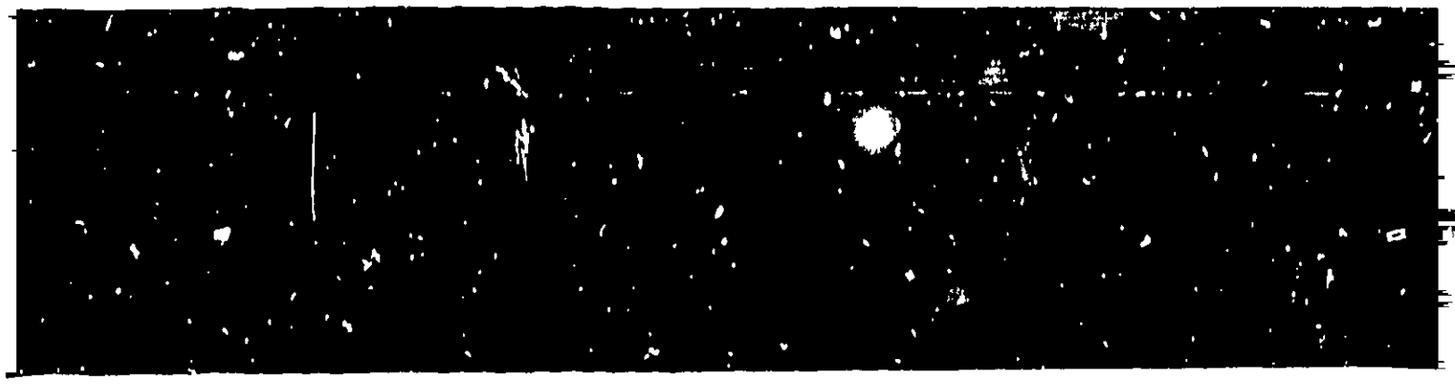
Marked Animals

In the July-December period, radio-collared deer were relocated 57 times from visual sightings, bare ground and aerial locations. Radio contact with deer CH5, collared in the spring of 1976, was lost after 10 August 1978. Male deer C2 was shot by hunters on 15 October 1978 in the upper Chamberlain Creek drainage below Castle Peak during the general season. Female C1 was not located after 4 October; radio failure or poachers were suspected. C4, a cohort of C1 until 4 October, remained within the study area, generally in the Lake Creek drainage coexisting with cattle. Female C6 had returned to the study area by 29 December. She inhabited the lower Germania Creek

Table 1. Ungulate food habits by percent instance of use, July-December, 1978.

	July	August	September	October	November	December
MULE DEER						
		412(2)[a]	241(3)	500(1)	399(4)	367(3)
Shrub		0	0	100.0	61.40	57.22
Forbs		100.0	98.76	0	38.60	42.78
Grass		0	1.24	0	0	0
ELK						
		208(1)	1054(2)	760(2)	713(3)	634(2)
Shrub		0	5.69	12.24	17.95	27.13
Forb		43.66	0	1.32	26.93	0
Grass		56.34	94.31	86.45	55.12	72.87
CATTLE						
	2236(5)	3564(5)	1952(5)	1734(4)		
Shrub	0.36	0.08	0	0	--	--
Forb	4.52	4.18	0	0	--	--
Grass	95.17	95.74	100.0	100.0	--	--

[a] Number of instances of use followed by number of feeding sites. All other figures in Table are percent.



drainage through the summer and fall, generally within an area of about one square mile.

Elk marked with numbered collars last winter were resighted seven times by U.S. Forest Service, Idaho Department of Fish and Game personnel and myself. A young bull marked on 7 March 1978 as a spike was shot this fall as a four-point in the headwaters of the west fork of the East Fork Salmon River.

Range Utilization

Twenty utilization transects in Pastures I & III were evaluated during August and early September (Pasture I) and during late October and November (Pasture III) with 51 sites and 41 sites in each pasture respectively. Transects were run from bottoms upslope to ridgetops with each site along the transect generally located at 200 foot elevational intervals. Elevation, aspect, slope, position on slope, distance from water and cover (and in some instances salt blocks) were noted at each site. The presence or absence of grazing on each species located within twenty 2 x 5 dm plots placed at three pace intervals along the contour were also recorded. Cow chips were counted at each site within ten 4-m^2 circular plots located on alternate 2 x 5 dm plots with the center point of the circular plot at the lower mid-point of the 2 x 5 dm frame.

Plant Production

Plant production was estimated on 23 sites within eight non-forested communities. Forbs and grasses clipped within ten 2 x 5 dm plots on each site were oven-dried and weighed. Sagebrush production on each site was estimated by applying the mean weight of 50 leaders clipped on the site to the number of new leaders counted within 10 square-meter plots. Clipped plant material from three sites was lost in the forestry building fire this fall.

Plant Phenology

Plant phenology was determined on 16 permanent sites at two-week intervals as well as on all feeding sites, June through October. Early snows in mid-September caused frost-kill on sagebrush inflorescences prior to anthesis at 7000 feet and above. There was, however, a second green-up of grasses and some forbs following the September snow. Continuous snow cover in late October terminated most plant growth.

Plans for Next Six Months

1. Continue gathering range distribution and food habits data.
2. Continue monitoring marked animals.
3. Continue gathering herd composition data for mule deer and elk.
4. Attempt to trap and mark more mule deer and elk.
5. Gather plant phenology information during the growing season.

* * * * * * * * *

Project WU-104:	Ecology of Badgers on the Snake River Birds of Prey Natural Area, Idaho
Investigator:	John P. Messick
Advisors:	Maurice Hornocker; Ian McT. Cowan (University of British Columbia)
Cooperators:	Department of Zoology, The University of British Columbia; Bureau of Land Management; Idaho Department of Fish and Game
Project Support:	U.S. Bureau of Land Management

Objectives:

1. Attempt to ascertain the density, sex and age structure, and other population parameters of badgers (*Taxidea taxus*) on the Snake River Birds of Prey Area, Idaho.
2. Explore the strategy of habitat use and describe the social organization of the badger population.
3. Gather information on the food habits of badgers as an aid to estimating the impact of this predator.
4. Collect information on the food habits of other important carnivores, coyotes (*Canis latrans*) and bobcats (*Lynx rufus*).

Status:

Field work completed. Dissertation is in preparation.

* * * * * * * * *

Project WU-107:	Experimental Reestablishment of Whooping Cranes in Western United States
Investigator:	Roderick C. Drewien, Research Wildlife Biologist
Project Support:	U.S. Fish and Wildlife Service
Supervision:	Elwood G. Bizeau
Cooperators:	Canadian Wildlife Service, U.S. Fish and Wildlife Service, Idaho Department of Fish and Game, Colorado Division of Wildlife, Wyoming Game and Fish Department, Utah Division of Wildlife Resources, New Mexico Department of Game and Fish

Objectives:

1. In cooperation with the Canadian Wildlife Service, annually transplant eggs from wild whooping crane nests at Wood Buffalo National Park in the Northwest Territories to the nests of selected color-marked sandhill crane foster-parents at Grays Lake NWR in Idaho.

2. Monitor nesting, hatching, rearing and behavior of the transplanted eggs (chicks) at Grays Lake; color-band juveniles.

3. Follow migration of foster-parent families and subadults to fall staging area in the San Luis Valley of Colorado and to wintering grounds along the Rio Grande River in New Mexico.

4. Monitor movements, activities and behavior of foster-parent families and sub-adults during the fall and winter in New Mexico.

5. Follow spring migration of sub-adults north and monitor their activities and behavior on summering areas.

Progress:

This report covers the period March through December, 1978.

Return to summering areas, 1978

The first subadult whooper returning on spring migration was sighted at Grays Lake on 4 April. Two other subadults arrived during April and a fourth bird by 14 May. All four birds spent the summer at Grays Lake. A fifth bird (yearling) arrived at the Fear Ranch, Middle Pine Creek in Sublette County, Wyoming between 6-12 April and summered there. A sixth whooper (two-year old) was not located until 31 August near Cokeville, Wyoming, where it was observed only briefly, then disappeared until it was sighted in the San Luis Valley, Colorado during the fall migration in October. Its summer location remains unknown.

Activities of sub-adults at Grays Lake

An activity area of an individual whooper is defined here as that area in which a bird confines the majority of its daily activities. It includes habitat for feeding, roosting, loafing and escape cover. It does not include those sites that are infrequently and only temporarily visited. Activity areas are not defended. A territory, in contrast, contains all the components of an activity area and is actively defended against other cranes.

The first two birds to arrive at Gray's Lake, 3-year-olds 75-1, and 75-4, both believed to be males, established activity areas in the southeast sector of the marsh. Both occupied the same general locations as during the previous summer. The areas they frequented were within one-mile of where they were hatched and reared in 1975.

Subadult 75-1 established a territory soon after its arrival at Grays Lake in April. This bird continued to occupy the same area until it migrated in mid-October. Sandhills entering the newly established territory were challenged and driven off by threats, pecks and running and flying attacks. In establishing the territory, this whooper drove off two breeding pairs of sandhills which had occupied the area in 1978.

Subadult 75-4 also exhibited some territorial behavior by defending sporadically a portion of a large slough. This whooper was not consistent in its defense behavior, but it continuously occupied the same locale, except for temporary departures, from the time it arrived in April until it migrated in mid-October.

Interestingly, both 75-1 and 75-4 occupied these same general activity areas during the 1977 summer without exhibiting any territorial behavior. If the behavior exhibited by these two males in 1978 is indeed preliminary to establishing breeding territories, then they should return to the same sites in 1979.

Two subadults, 3-year-old 75-7 and two-year-old 76-15, both believed to be females, established activity areas on the northern half of the marsh some 4-8 miles from the other two birds and 1½ - 4 miles from where they were hatched and reared. Both birds moved and reestablished new activity areas during mid-summer, relocating about 4 miles from the sites they occupied during the spring and early summer. Although these two cranes were observed together on several occasions, neither came in contact with the two whooper males located in the southeast portion of the marsh and possibly were not aware of their presence.

Size of activity areas for the four subadults at Grays Lake ranged from 200 - 1,000 acres.

Arrival and Hatching of 1978 Whooping Crane eggs

Fifteen whooping crane eggs produced by captive stock at Patuxent Wild-

life Research Center, Maryland, arrived at Grays Lake on May 13 and May 25 and were placed in sandhill nests; 13 eggs from Wood Buffalo National Park, Northwest Territories, Canada, were placed in foster-parent nests at Grays Lake May 29-31.

Of the 15 eggs received from Patuxent, five hatched; nine of the 15 eggs received from Canada hatched. A summary of the success of Canadian eggs transported to Grays Lake and the nestmate eggs left at Wood Buffalo National Park is presented in Table 1.

Survival of Whooping Crane Chicks

Although five whooping crane chicks hatched from eggs originating at Patuxent, none were definitely known to have survived beyond 15 June.

Of the nine chicks hatched from Canadian eggs, four vanished by 15 June when the chicks were less than 3 weeks old. Causes of mortality were unknown. Two more young perished in mid-June and early August, respectively, with predators assigned as the probable cause.

The three young whoopers which survived were first observed flying short distances when 81-85 days old.

Banding and Color-marking

With aid of a helicopter, the three young whooping cranes at Grays Lake were captured, banded and color-marked on 5 and 18 August. Dr. Drewien traveled to Canada to assist Canadian Wildlife Service personnel in capturing and color-marking Canadian whooper chicks in Wood Buffalo National Park on August 7-8. In addition, 105 sandhills were captured in Idaho and Wyoming, including 14 adults and 91 young; some of these will be candidates for future foster-parenting at Grays Lake.

Fall Migration

Subadults

The six subadult whoopers departed from summer areas in Idaho (4 birds) between 2 September - 13 October and from southwest Wyoming (2 birds) 1-25 September. Five of the six were located in the San Luis Valley, Colorado between 10 October - 28 November. All six arrived in New Mexico between 10 October - 30 November. The time spent by individual whoopers enroute from summer areas to New Mexico ranged from 5½ to 88 days with a mean of 45. Fall migration chronology is presented in Table 2.

Foster-parent Families

The three foster-parent families migrated from Grays Lake between 9-11 October and were all located in the San Luis Valley (Table 2). They arrived in New Mexico between 8-14 November. Foster-parent families used 28-35 days to complete the migration from Idaho to New Mexico.

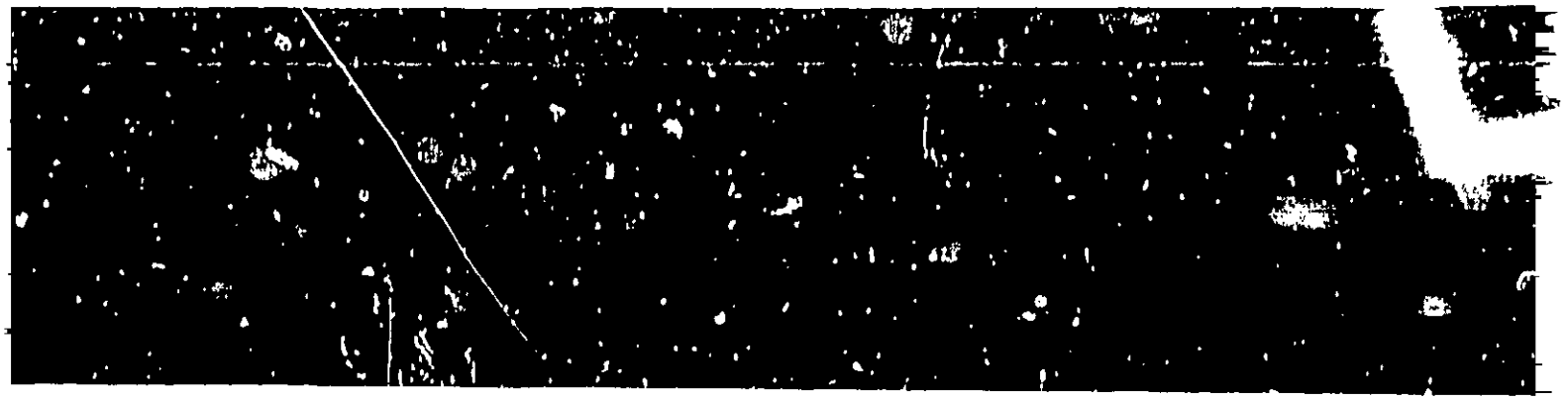


Table 1. Comparison of whooping crane egg success in 1978 for eggs remaining in nests in Wood Buffalo National Park, N.W.T., Canada, and for eggs transported to Grays Lake NWR, Idaho, and incubated by sandhill cranes.

Nest No. at Wood Buffalo Park[a]		Egg Success[b] Canada	Idaho	Hatching Dates (Idaho)	Potential Egg Success Rating[f]
78-1	Sass River	S	S	3-4 June	0
78-2	Sass River	U[c]	S[g]	29 May	0
78-3A	Klewi River	U[c,d]	U	--	-6
-3B	" "	--	U	--	-6
78-4	Sass River	S[d]	--	--	0
78-5A	Sass River	U[c,d]	U	--	-10
-5B	" "	--	U	--	-10
78-5	Sass River	S[e]	--	--	?
78-7	Klewi River	S	S	4-5 June	-1
78-8	Klewi River	S[d]			
78-9	Klewi River	S	S	8 June	-2
78-10	Klewi River	S	S	8-9 June	-2
78-11	Little Buffalo River	U	S	8 June	0
78-12	Nyarling River	S	S	8-9 June	0
78-13	Klewi River	S	S	9-10 June	-2
78-14	Klewi River	S	S	9-10 June	-2
78-15	Nyarling River	U[e]	--	--	?

[a] Identification numbers assigned to nests by E. Kuyt, CWS.

[b] S = Successful, U = Unsuccessful

[c] Uncertain whether egg was unsuccessful or chick vanished soon after hatching.

[d] Single eggs removed from nests 78-4 and 78-8 and substituted into nests 78-5 and 78-3. The entire clutches of nests 78-3 and 78-5 were removed and sent to Idaho.

[e] 1-egg clutch, egg not removed.

[f] Potential egg success is rated (0 = excellent to -10 very poor) by E. Kuyt and is based upon reproductive performances of each pair in past years.

[g] Egg pipped.

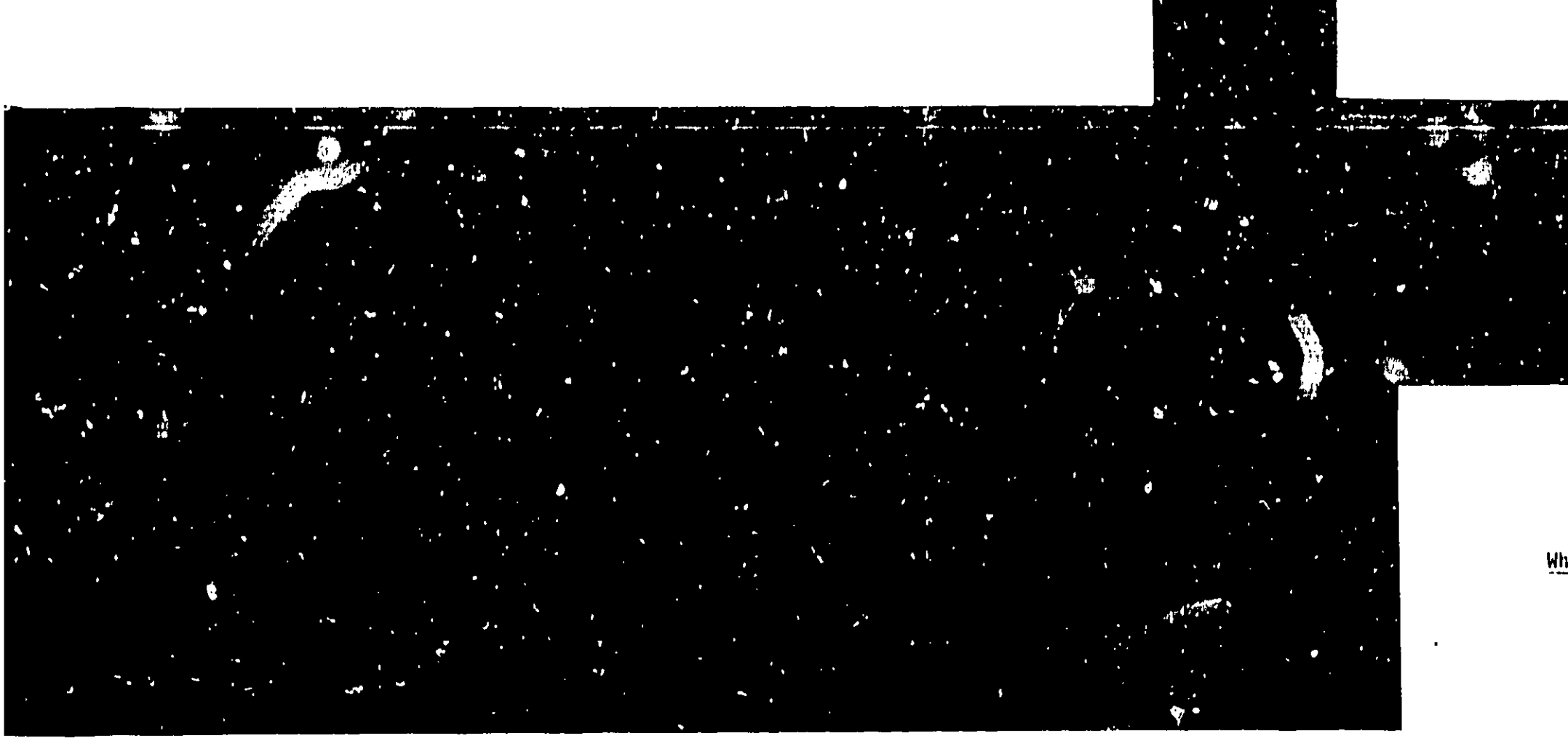


Table 2. Fall migration chronology of foster-parent families and subadult whooping cranes from summer areas to winter areas. A question mark indicates that the identification of the individual bird was uncertain.

Whooper I.D. No.	Summer Area: Location	Summer Area: Date Departed	Migration Stop: Location	Migration Stop: Dates Observed[1/]	Winter Area: Location	Winter Area: 1st Obs.
Subadults						
75-1	Grays Lake	12-13 Oct.	San Luis Valley,CO	17 Oct-15 Nov.	Edeal Dairy Los Lunas	20 Nov.
75-4	" "	12 Oct.	" " " "	17-31 Oct.	Los Lunas	10 Nov.
75-7	" "	2 Oct.	" " " "	8-31 Oct.	Edeal Dairy	20 Nov.
76-7	Near Cokeville,WY	1 Sept.	1. Near Hayden, CO(?) 2. San Luis Valley	18 Sept. 18 Oct-28 Nov.	Bernardo Refuge	30 Nov.
76-15	Grays Lake	4 Oct.	———— NOT SIGHTED ————		Bosque Refuge	10 Oct.
77-17	Near Daniel, WY	25 Sept.	San Luis Valley	1 Oct-28 Nov.	Edeal Dairy	25 Nov.
Juveniles						
78-1	Grays Lake	9 Oct.	San Luis Valley	4 Nov.[2/]	Bernardo Refuge	9 Nov
78-9	" "	10/11 Oct.	" " "	18 Oct-8 Nov.	1. Los Lunas(?) 2. Las Nutrias	14 Nov. 19 Nov.
78-10	" "	10/11 Oct.	" " "	17 Oct-3 Nov.	Bosque Refuge	8 Nov.

1/ Dates represent the period that individuals were known to be in Valley.

2/ Reported by residents to have been in area for 3-4 weeks prior to this date.

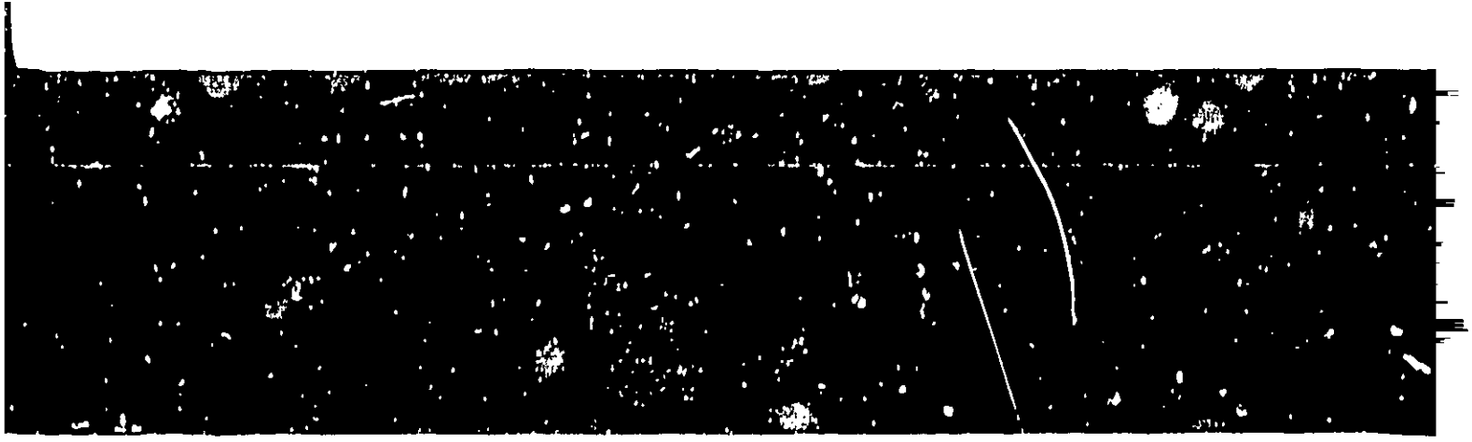
Whooping Cranes on Wintering Areas in New Mexico

Distribution and Status

Subadults. All six of the subadults were in their usual wintering range in the Rio Grande Valley at the close of the year, ranging from a few miles south of Albuquerque to Bosque del Apache NWR; five of the six moved their activity spheres two or more times after arriving in New Mexico.

Foster-parent families. The three foster-parent families arrived in the Rio Grande Valley of New Mexico between 8-14 November. Two families remained there through the close of the year while the third family disappeared; it was later relocated in the state of Chihuahua in northern Mexico.

* * * * * * * * * * *



WU-109a Wood Duck Nesting Ecology

Investigator: Joe Miles

Advisor: Elwood G. Bizeau

Project Support: Idaho Department of Fish and Game

Overall Goal: To develop a transplant program for wild wood duck hens and ducklings which can be efficiently utilized by state and federal wildlife agencies.

Objectives: The primary objectives of this project are to:

1) Estimate the mean length of incubation for wood ducks on the Coeur d'Alene Wildlife Management Area.

2) Develop techniques which will enable field workers to accurately predict the hatching dates of wood duck clutches.

3) Test the hypothesis that disturbance increases the length of the incubation period for wood ducks.

JUSTIFICATION

Through the transplanting of wild wood duck (*Aix sponsa*) hens and ducklings, Gadwa (1977) demonstrated that new breeding populations can be established in formerly unutilized habitats in northern Idaho. Although the transplanting program was successful, some techniques require further investigations to be efficiently utilized by state and federal wildlife agencies. The major aspect needing further study is the technique of predicting the hatching dates of the transplant nests. Westerskov (1950) developed several techniques for predicting the hatching dates of the ring-necked pheasant (*Phasianus colchicus*), but no statistical analysis was made.

The majority of the study will be conducted on the Coeur d'Alene River Wildlife Management Area. The management area covers approximately 15 miles of the lower Coeur d'Alene River Valley and is located in the southeastern quarter of Kootenai County.

METHODS

Determining the Length of the Incubation Period

A search for nesting wood ducks will be initiated early in April. A nest which is an active laying site will receive continued surveillance until the clutch is complete. The day following the completion of the clutch will be considered the beginning of the incubation period (Bellrose 1955). This definition may be considered arbitrary as incubation may begin slightly prior to the completion of the clutch (Dixon 1924). After incubation has begun, the nest will not be inspected for 25 days. Following this period, daily

inspection will resume until the hatch is completed. The time interval between the laying of the last egg and the hatching of the last egg will be considered the length of the incubation period (Dane 1966, Drent 1970). A sample size of at least 20 nests is proposed. The mean, range, and standard deviation of the incubation length will be calculated.

Predicting the Hatching Date

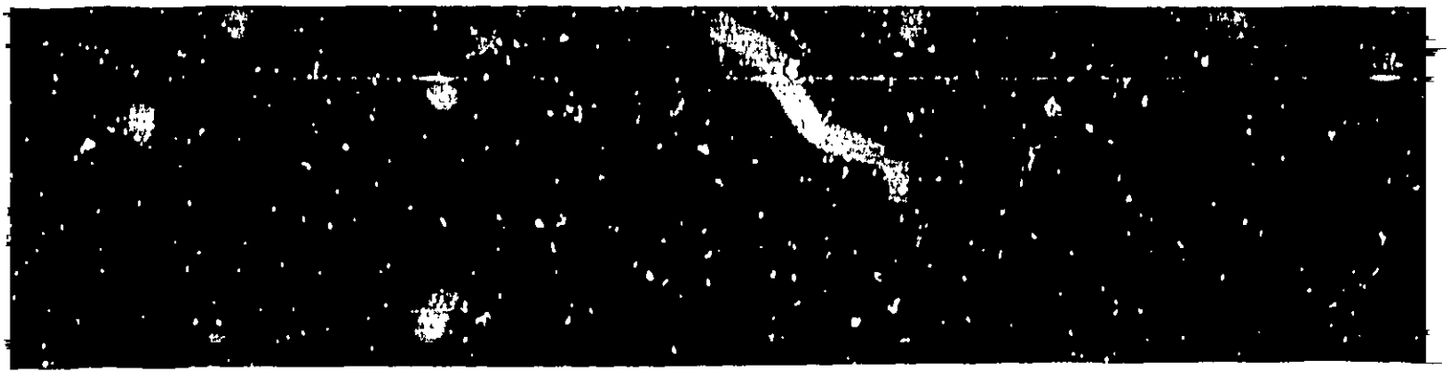
To predict the date when an egg will hatch, the dynamic characteristics of a developing egg must be identified. Techniques which will be employed to predict when an egg will hatch include candling the egg, weighing the egg, calculating its specific gravity, measuring the size of the air cell, and floating the egg in water.

Data will be collected from eggs under two different types of incubation. One group of eggs will be incubated in a Roll-X automatic incubator (Marsh Mft. Company, Garden Grove, Calif.). Approximately 90 eggs (8 clutches) for automatic incubation will be collected on the day they are laid to assure that no incubation has occurred. The eggs will be replaced in the nest with dummy eggs or addled eggs from other nests to encourage the hen to continue laying. The eggs will be stored at 55°F for a period not to exceed 15 days. Within the automatic incubator, the dry bulb temperature will range from 100.5°F to 101.5°F, and the wet bulb temperature from 83°F to 87°F (Doty 1972). After 28 days, the eggs will be placed in a hatcher with a wet bulb temperature ranging from 92°F to 94°F (Doty 1972). Hatched ducklings will be returned to boxes where hatching is occurring, to boxes where hens are incubating dummy eggs, or to broods which are being transplanted. The second group of eggs will be incubated under natural conditions in the field and will be monitored by Rustrak temperature and event recorders (Gulton Industries, East Greenwich, Rhode Island). A continuous record of nest temperature and attentiveness will be maintained. Under this field condition, data from approximately 44 eggs (4 clutches) will be collected.

Weight Loss. As an embryo develops, water and carbon dioxide in gaseous states are passed out through the shell. A measurable decrease in the total weight of an egg occurs (Horton 1931, Romanoff and Romanoff 1949). The following method will be used to evaluate the relationship between the weight of an egg and the amount of incubation it has received. Each egg will be weighed to the nearest .01 gram every 24 hours. A record will be maintained on the weight loss for each egg for the duration of the incubation period.

Specific Gravity. To minimize the variation associated with different egg sizes, the specific gravity of each egg will be calculated daily. Specific gravity is the constant ratio of weight to volume. The volume of an egg may be determined by water displacement (Hanson 1954). Volume can also be calculated from equations developed by Bergtold (1929) or Barth (1953) using the measurements of egg length and breadth. Length and breadth of each egg will be measured with a sliding caliper to the nearest 0.1 millimeter.

Size of the Air Cell. As the embryo develops, the size of the air cell



increases. The depth and the diameter of the air cell will be measured and recorded to the nearest 0.1 millimeter every 24 hours.

Floatation. The relative position of an egg placed in a container of water will change through the incubation period (Westerskov 1950). The egg will remain near the bottom of the container during the early stages of incubation. During this period, the angle of floatation will increase from 0^{o} - 90^{o}. Midway through incubation, the egg will float to the surface. At the later stages of incubation, more of the blunt end will protrude above the surface and the angle of floatation will continue to increase. The angle of floatation will be measured to the nearest degree with a protractor and recorded daily. The diameter of the egg protruding above the surface will be measured to the nearest 0.1 millimeter and recorded daily.

Age Analysis. Regression techniques will be employed to analyze the data and develop models which will predict the age of the embryo (Ott 1977). The dependent variable (Y) will be the age of the embryo in hours. The independent variables (X_1, X_2, X_3, X_4, X_5, X_6) will be the weight of the egg, the specific gravity of the egg, the diameter of the air cell, the depth of the air cell, diameter of the shell protruding above the surface of water, and the angle of floatation. To minimize variation, eggs will be divided into 3 size classes, and regression techniques will be applied to each class.

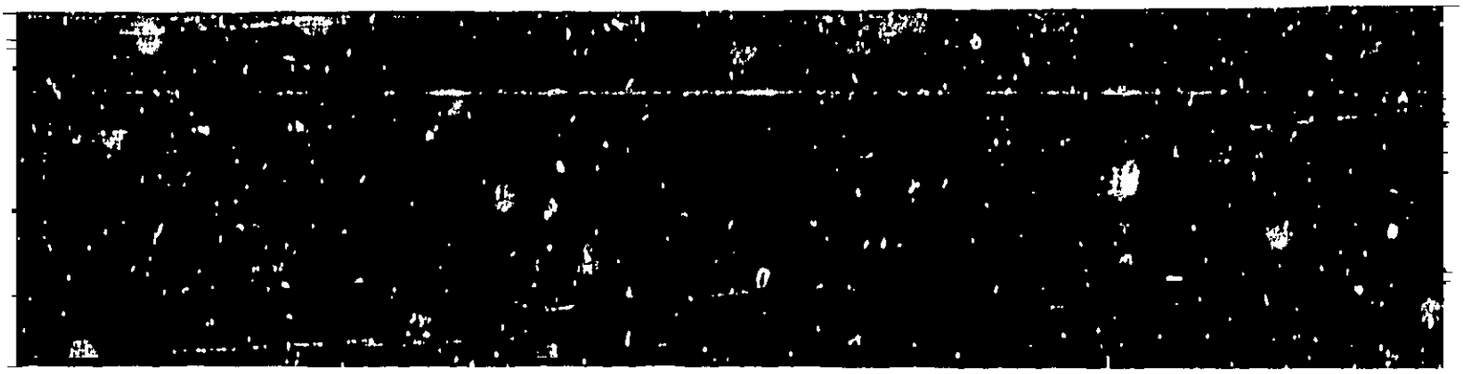
A simple linear regression will be made for each independent variable using the model $Y = \beta_0 + \beta_i x_i$ (β_0 = Y intercept and β_i = the slope associated with each independent variable.) The coefficient determination (r^2) will be calculated for each independent variable to ascertain the amount of variation that can be explained by the regression line. The independent variable with the largest coefficient of determination will be considered the best individual technique for estimating the age of the embryo.

A multiple regression will be made including all six independent variables in the model $Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \varepsilon$. The coefficient determination (R^2) will be calculated to ascertain the amount of variation that can be explained by regression. The effect of each independent variable on the dependent variable will be evaluated with a t test. A 95% confidence interval will be constructed around the model.

Candling. All eggs will be candled approximately every 24 hours. The age of embryonic events will be recorded. Events will include the appearance of the blastodisc, the beginning of the heart beat, the growth of the amnion and the allantois, leg movement, peeping, and pipping. The mean, range, and standard deviation of age will be calculated for each event. A photographic record of typical events will be made using transmitted light as described by Hanson (1954).

Disturbance during Incubation

A completely randomized design (Ott 1977) will be employed to test the hypothesis that disturbance will increase the length of the incubation period



(Breckenridge 1956). Four treatments will be established (1) a control clutch which is automatically incubated, (2) a control clutch which is incubated by a wood duck hen, (3) a disturbed clutch which is automatically incubated (4) a disturbed clutch which is incubated by a wood duck hen. Three clutches will be randomly assigned to each treatment (n = 12). The length of incubation of each clutch will be the experimental unit. Nests incubated by the wood duck hens will be monitored with recorders to receive a continuous record of nest temperature and attentiveness. Automatically-incubated clutches will be disturbed by removing the eggs from the incubator for a period of 24 hours. The clutches incubated by wood duck hens will be disturbed by routine nest inspection including banding of the hen and candling of the eggs. A one-way analysis of variance, an F test, and a Duncan's New Multiple Range Test will be employed to test for significant difference ($P < 0.05$) in the mean length of incubation between treatments. The computer statistical analysis system (SAS) will be used to calculate the tests (Barr et al. 1976).

Duration of Project

Two field seasons, beginning in early April, 1979.

* * * * * * * * * * *

LITERATURE CITED

Barr, A. J., J. H. Goodnight, J. P. Sall, and J. T. Helwig. 1976. A user's guide to SAS 76. SAS Institute, Inc. Raleigh, N.C.

Barth, E. K. 1953. Calculation of egg volume based on loss of weight during incubation. Auk 70:151-159.

Bellrose, F. C. 1955. Housing for wood ducks. Ill. Nat. Hist. Surv. Circ. 45. 48;;.

Bergtold, W. H. 1929. Egg weights and egg measurements. Auk 56:466-473.

Breckenridge, W. J. 1956. Nesting study of wood ducks. J. Wildl. Manage. 20(1):16-21.

Dane, C. W. 1966. Some aspects of breeding biology of the blue-winged teal. Auk 83(3):383-402.

Dixon, J. 1924. Nesting study of the wood duck in California. Condor 26:41-66.

Doty, H. A. 1972. Hatchability test with eggs from captive wood ducks. Poultry Sci. 51(3):849-853.

Drent, R. H. 1970. Functional aspects of incubation in the herring gull. Pp. 1-132. In Baerends, G. P. and R. H. Drent (Eds.) The herring gull and it's egg. Behavior Supplement 17. 312pp.

Gadwa, G. W. 1977. Experimental transplanting of wild wood duck hens and broods in northern Idaho. M.S. thesis. Univ. Idaho, Moscow.

Hanson, H. C. 1954. Apparatus for the study of incubated bird eggs. J. Wildl. Manage. 18:191-192.

Horton, D. H. 1931. The loss of weight of duck eggs during incubation. Poultry Sci. 11(1):23-27.

Ott, L. 1977. An introduction to statistical methods and data analysis. Duxbury Press, North Scituate, Mass. 730pp.

Romanoff, A. L., and A. J. Romanoff. 1949. The avian egg. John Wiley and Sons. New York. 918pp.

Westerskov, K. 1950. Methods for determining the age of game bird eggs. J. Wildl. Manage. 14(1):56-66.

Project WU-110:	Population characteristics and dynamics of river otter (*Lutra canadensis*) in west-central Idaho
Investigator:	Wayne E. Melquist
Assistants:	Joan Antle, Jackson Whitman, Kate Wynne
Advisor:	Maurice G. Hornocker
Project Support:	U.S. Fish and Wildlife Service, National Wildlife Federation, Idaho Department of Fish and Game, University of Idaho

Objectives

1. Determine otter population density, sex and age structure, breeding age, reproduction and mortality rates.
2. Describe seasonal activity patterns, movements and spatial distribution of otter and relate these to food habits, population size, structure and density.
3. Evaluate the dynamics of an otter population in an area with a wide range of human influence.
4. Investigate the inter-relationships of otter and mink on the study area.

Progress:

Food habits (otter). This report covers field data collected for the period [illegible] through December 1978. During this time, a total of 322 otter scats was collected (1,762 thus far in the study). Analysis has been completed on 912 scats. Fish occurred in more than 94%, representing the most important prey for otter in this area. Other major food items, which are largely of seasonal importance, include invertebrates (12%), birds (5%) and mammals (4%).

Observations of instrumented otter indicate a difference in the feeding behavior of juvenile and older otter. Juveniles tend to feed on smaller and occasionally different kinds of prey. In the fall, juveniles were observed foraging and feeding on diving beetles (Family Coleoptera) and dense schools of small bullheads (*Ictalurus* sp.). The pups make a transition to larger prey as they grow and their foraging ability increases. Older animals also feed on small prey, but to a lesser extent.

Food habits (mink). During this period, 235 mink scats were collected. This brings the total collection to 422 scats. Analysis has only recently begun. Thus far, it appears that mammals are the dominant prey consumed by mink. Mice hair occurs in most scats collected. Scats collected at or near the McCall Fish Hatchery contained primarily fish remains, suggesting that mink, like otter, are opportunistic and feed on the most available prey. Generally, the most abundant prey is usually the most available, although this does not hold true in all cases.

In addition to fish and mammals, shell fragments from bird eggs and other bird remains have showed up in mink scats. In August, the remains of a muskrat and mallard hen that mink had preyed upon were found. The mallard had been accidentally caught in a Hancock live trap set for otter. Being confined in the trap, it was easy prey for mink.

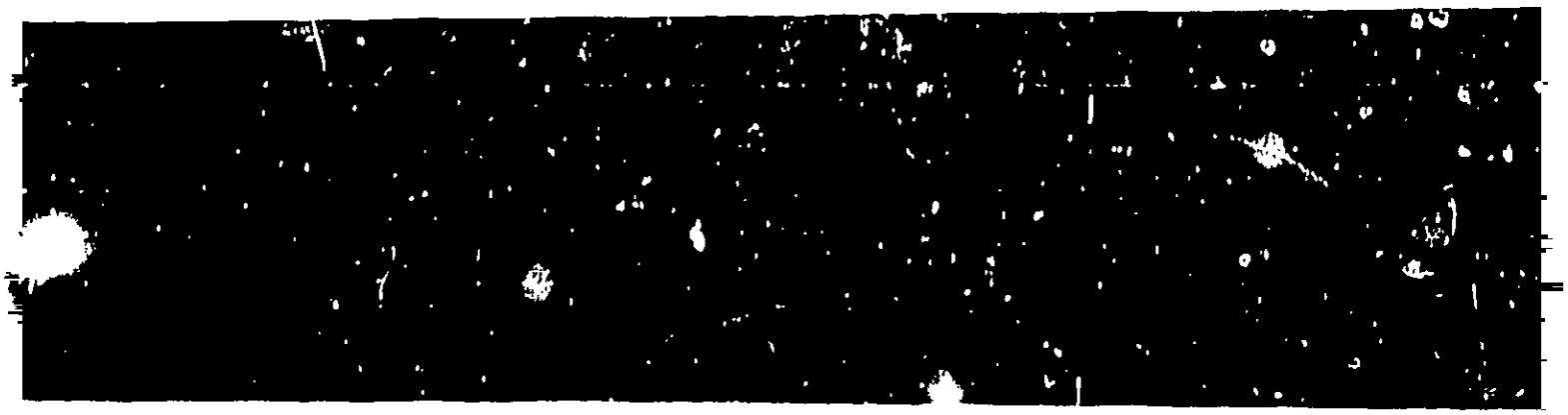
Trapping. A total of 2,082 trap nights resulted in the capture of 10 otter (Table 1). Nine of these captures were made in Hancock traps; one in a Tomahawk trap. Three of the otter (M34, F35, F36) were captured simultaneously in a single Hancock trap. All otter captured during this period were juveniles (Table 2). Trapping for otter was terminated in mid-November due to freezing temperatures.

Table 1. Summary of captures for the period July-December 1978.

Species	Males	Females	Captures (C)	Recaptures (R)	C&R	Ear Tagged	Instrumented
Otter	3	3	6	4	10	6	6
Mink	19	13	32	59	91	30	5
Marten	2	0	2	2	4	2	0
Other (13)	-	-	67	-	67	-	-

Table 2. Otter captured during the period July-December 1978.

Date	Animal No.	Sex	Age	Weight(Kg)	Recapture date
8-02-78	31	F	Juvenile	4.08	8-29-78; 9-19-78
9-02-78	32	M	"	4.08	11-13-78
9-22-78	33	M	"	5.08	10-21-78
9-29-78	34	M	"	4.54	---
9-29-78	35	F	"	4.79	---
9-29-78	36	F	"	5.13	---



Mink traps were set for 1,496 trap nights and accounted for 82 captures (Table 1). Additionally, eight mink captures were made in traps set for otter, and one mink was caught by hand. Mink M110, a juvenile male, was recaptured nine times. Multiple recaptures were made on several other mink. Trappers caught at least four tagged mink during the trapping season, one of which was M134, an instrumented animal.

Two marten were captured in mink sets. These animals were tagged and released. M77, initially captured on 20 July 1978 near the mouth of Fisher Creek, was caught by a trapper on 3 November at the upper end of the drainage.

Sixty-seven individuals representing 13 additional species were caught in mink and otter traps. The different species and numbers caught include muskrat (36), beaver (7), Columbian ground squirrel (7), red squirrel (5), porcupine (3), striped skunk (2), deer fawn (1), raccoon (1), coyote (1), snowshoe hare (1), mallard (1), spotted sandpiper (1), and squawfish (1).

A total of 28 otter traps were sprung without capture. Otter were responsible for at least two sprung Hancock traps. A total of 104 mink traps were sprung without capture. Small rodents, crumbling earth, fluctuating water levels, weasels, and mink were responsible for numerous sprung traps.

Radiotracking (otter). During this reporting period, radios were implanted in six otter by Dr. G. Dale Smith, DVM (Table 3). The radio in a seventh otter (F30) malfunctioned shortly after the start of this reporting period; tracking data for this animal are summarized for the entire monitor period.

Although F31 was monitored for only 34 days, she retained a radio for 69 days until shot by duck hunters. We retrieved the animal and Dr. Smith and I performed a post-mortem examination. She appeared healthy and the incision site was hardly noticeable. Internally, the radio implant did not appear to have any adverse effect.

Initially, the incision was made ventrally on the linea alba. Otter frequently rub and slide on their ventral surface. In two otter, we felt this rubbing, combined with the transmitter lying against the incision, caused breakage of the sutures. Lateral incisions have been made on the last five otter, apparently solving this problem.

The radios in M32 through F36 were transmitting normally at the end of this reporting period. These otter have provided a great deal of data on movements, activity patterns, predator-prey relationships and social organization.

Radiotracking (mink). During this period, five mink were outfitted with radio collars (Table 3). Three of the five mink provided data on movements, activity patterns, intra- and interspecific relationships.

Mink, like otter, tend to be active at all periods of the day and night. Both species have an affinity for logjams and areas of dense riparian vege-

Table 3. Summary of otter and mink location data based on radiotracking, July - December 1978.

	OTTER							MINK		
	F-30	F-31	M-32	M-33	M-34	F-35	F-36	M122	M130	M134
Date Monitor Initiated	5-04-78	8-24-78	9-30-78	10-11-78	10-24-78	10-24-78	10-24-78	9-19-78	9-25-78	9-25-78
Data Period (Days)	63	34	93	82	69	69	69	11	61	59
Total Monitor Time (hrs/min)	142/43	118/04	233/03	189/24	69/49	79/10	79/10	11/34	38/53	65/44
Total Visual Obs (hrs/min)	1/10	10/52	2/04	0/47	0/45.5	1/09	1/11	0	0/01	0/04
Number of Locations	42	49	118	99	80	82	82	13	44	72
Number of Movements Between Locations	25	37	95	75	74	70	70	10	39	65
Total Distance Moved Between Locations (km)	24.05	47.38	150.47	89.71	130.71	142.03	142.19	9.26	7.02	16.86
Mean Distance Moved Per Movement (km)	0.96	1.28	1.58	1.20	1.77	2.03	2.03	0.93	0.18	0.26
Longest Straight Line Movement Between Locations (km)	2.5	5.4	17.5	17.5	7.9	7.9	7.9	2.69	1.0	1.08
Straight-line Distance Between Maximum Locations (km)	9.92	11.7	22.4	18	14.09	14.09	14.08	2.69	1.05	1.1
Actual Distance Between Maximum Locations (km)	17.7	13.8	26.85	24.3	22.2	22.2	22.2	3.9	1.5	1.4
Location Interval (mean days)	1.5	1.44	1.27	1.2	1.16	1.19	1.19	.85	1.39	.82

tation along streams. Similar to otter, mink use several den sites and resting areas.

Male mink M130 and M134 occupied the same section of Lake Fork Creek without any apparent aggressive interactions. With the exception of one or two instances, these animals remained separate, using different den sites.

Otter/mink inter-relationships. Mink M130 and M134 and otter M32 and M33 were frequently monitored simultaneously during the spawning run of kokanee on Lake Fork Creek above Little Payette Lake. Generally, when M32 and M33 were in the logjam area, there were from five to seven or more otter utilizing the area. The presence of otter did not alter the activities of the instrumented mink. Both otter and mink were occasionally active at the same time in the logjam complex that spans the entire creek and extends approximately 100 m down one channel and 50 m or more down the main channel. One or the other mink occasionally passed within 15 m of resting otter. Both otter and mink were inactive in logjam dens within 10 m of each other.

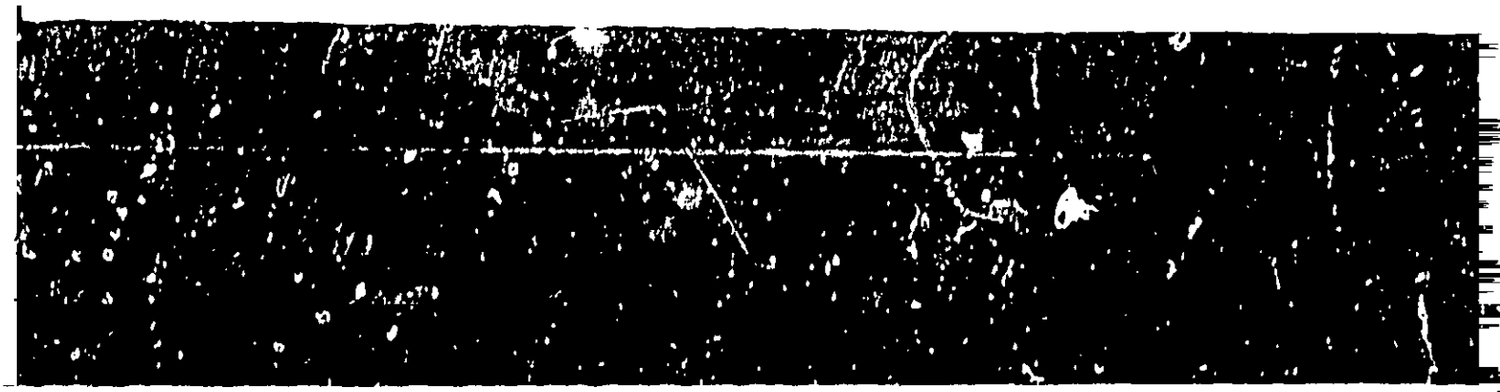
Size difference of mink and otter and perhaps the agility of the mink, allowed them to occupy the same area with little threat to the mink. The abundant food supply prevented any competitive interaction between the two species. When prey abundance was reduced (the kokanee run terminated), the otter moved to other parts of their territory, thus avoiding any competition for the available food supply.

Activity patterns and movements (otter). During this reporting period, otter were present throughout most of Lake Fork Creek, and the Payette River between Payette Lake and Cascade Reservoir. In late summer and early fall, one family group spent a great deal of time near the mouth of Lake Fork Creek. In late fall and early winter, tracks of a group of four or five otter were seen on several occasions in this same general area and slightly downstream. There was no indication that the larger group ventured any farther upstream than the mouth of Lake Fork Creek.

M32 and M33 were seen in separate groups of four and two or possibly more on different occasions. Most of the time they occurred together with three other otter (one adult). This made it difficult to determine whether or not they were siblings. On several occasions, they occupied separate den sites only a short distance apart, suggesting they may not be related. It is not uncommon for pups to accompany unrelated family groups.

We anticipated the presence of otter on the Payette River above Payette Lake, especially during the fall kokanee run. Contrary to 1976 and 1977, this did not happen in 1978. In fact, this super-abundant food supply, utilized by at least seven otter in 1977, went untouched by otter in 1978. The only sign of otter in the area was of one or more that passed through some time in September or October. During the fall, competent observers did see a family group in Payette Lake and a single otter at Upper Payette Lake.

As reported in the last semi-annual, F30 moved up the Payette River



shortly after being released on 4 May 1978. From 10 May until we finally lost contact with her in early July, she apparently remained in a five km section of the Payette River downstream from just below Payette Lake. The absence of sign during the fall at several sites used by F30 indicated she probably moved.

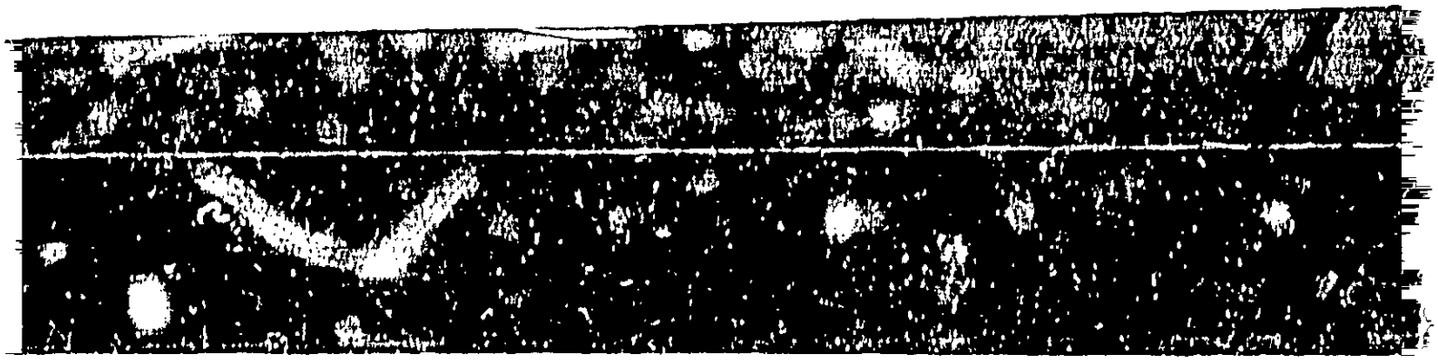
M32 and M33 were captured at the Lake Fork Creek logjam above Little Payette Lake. For the past three years, otter have concentrated in this area during the fall spawning run of kokanee. After being released on 30 September and 11 October, respectively, both otter remained in this area in the company of other otter for much of the time until early December. By this time, spawning and spent kokanee had all but disappeared from the area. Between October and December, these otter made occasional trips downstream as far as to the mouth of Lake Fork Creek, a distance of about 26 km. These movements were made when M32 and M33 were together, as well as in separate groups. From 9 December until the end of the month, M32 and M33 were part of a single group that remained in the Lake Fork Creek area approximately 13 km south of Little Payette Lake. Most of this time was spent in a mill pond along Highway 55.

M34, F35 and F36 were captured together along the Payette River approximately 10 km south of McCall. During captivity, F35 and F36 always remained together, while M34 appeared to be more solitary. When released on 24 October, M34 got separated from the other two. He remained alone for 26 days, despite several opportunities to join the others. F35 and F36 joined a female and an untagged pup within a day after being released. On 20 November, M34 joined this group and they have been together ever since. During October and November, the otter spent considerable time on the Payette River below McCall, possibly due to the presence of spawning kokanee. Since late November, with the exception of an occasional trip almost up to Payette Lake, the group has remained in three general areas on the Payette River six to 12 km south of McCall.

Dispersal (otter). The absence of several otter tagged as juveniles on the Payette River above Payette Lake in 1977 suggests that dispersal from the natal area is occurring. Instrumented juveniles have remained in the area at least until January. Dispersal would likely occur before the spring breeding season, although we have no documented evidence of this.

Family breakup may occur any time between September and the following spring. Lone juveniles are occasionally observed in September. They are capable of surviving independently by August, about two months after emergence from the natal den. With one exception, F31, a juvenile female, remained solitary during the time she was monitored (August-October). Contrary to this, the other five juvenile otter monitored this fall have remained in social groups which include adults.

Den sites and resting areas (otter). Numerous resting locations are used by otter. These sites are determined for instrumented otter when the animals are recorded as inactive. All locations may be considered resting areas but there is a distinction betwen the two types of sites. Den sites



may be used repeatedly; they provide shelter, protection and security. Resting areas are generally not used more than once and usually do not provide much shelter or protection.

Den sites and resting areas for otter on the Payette River are listed in Table 4. Less than half of the sites were used more than once. Den sites used repeatedly are found in areas where otter tend to concentrate. Several den sites were not used (unavailable to otter) when ice and snow began to accumulate. Active and old beaver lodges, bank dens and tunnels were most frequently used by otter. Four otter and at least three beaver were recorded in one lodge at the same time.

Sign of past and present beaver activity on Lake Fork Creek is far less than on the Payette River. Consequently, fewer den sites created by beaver are available and used by otter on Lake Fork Creek (Table 5). While concentrating on spawning kokanee above Little Payette Lake, M32 and M33 used six different den sites located in a massive logjam, all within a 20 m radius. Den use in this area appeared to be influenced by the presence of unrelated groups of otter.

Den sites and resting areas (mink). M130 and M134 used den sites that were both close to and well away from water. Most sites were within approximately 20 m of Lake Fork Creek. Two exceptions were dens located approximately 75-200 m from the Creek. Both mink used a variety of den types, including logjams, road rip-rap, undercut banks, brush piles and boulders (Table 6). Similar to otter, the mink used several sites only once. These might be considered simply as resting areas. Dens located in the major logjam complex are often within 10 m of otter den sites. The types of dens used by M122 on the Payette River compared to dens used by M130 and M134 on Lake Fork Creek would indicate den site selection is based on availability of sites that provide shelter, protection and security.

Population size. An aerial flight on 16 December 1978 indicated there was a group of four otter at the headwaters of the Payette River; a single otter and a group of five (including M34, F35, F36) on the Payette River below Payette Lake; two otter on Lake Fork Creek above Little Payette Lake; a group of five (including M32 and M33) on Lake Fork Creek between Little Payette Lake and Cascade Reservoir; and a group of four or five at the confluence of Lake Fork Creek and Cascade Reservoir. This would indicate a minimum population density of 21-22 otter on the study area. This agrees with previous population estimates of 20-30 otter.

Mortality. Several mortality factors for otter and mink have been described in previous semi-annual reports. One instrumented otter was killed during this reporting period. On 10 October F31 was shot and killed by duck hunters. The two hunters responsible were apprehended and prosecuted.

One instrumented and several tagged mink were caught by trappers during the fall trapping season. Several juvenile mink appeared quite unhealthy when live-trapped. Some of these individuals died before they could be

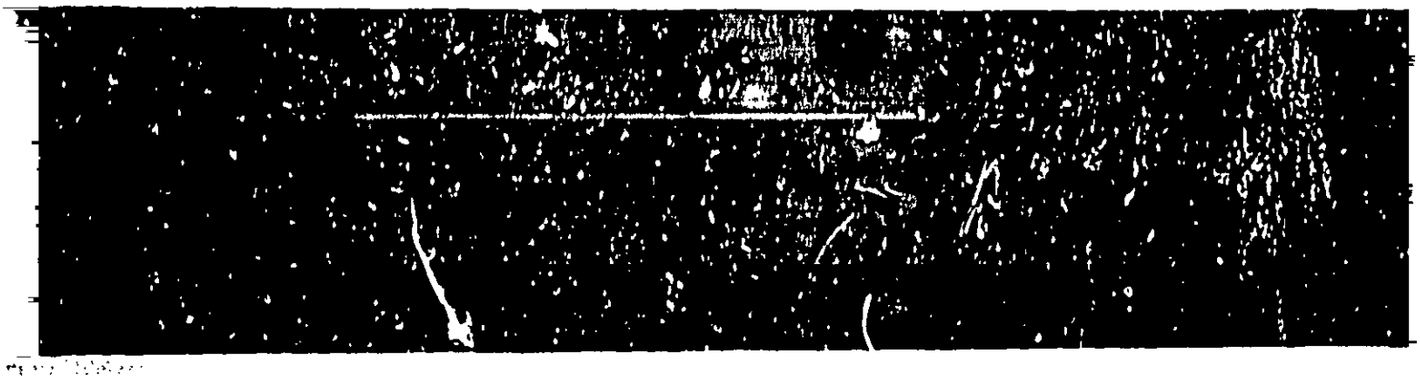


Table 4. Densities and resting areas used by instrumented otter on the North Fork Payette River drainage, July-December, 1978.

Description	Days Used		
	M-34	F-35	F-36
Beaver Lodge*	1		
Small Logjam	1		
Beaver Lodge	3	1	1
Old Irrigation Dam Structure	2		
Beaver Bank den (active)	4	2	2
Old Bridge Struture	1		
Logjam Den*	6	7	7
Natural Bank Den	1		
Beaver Bank den (active)	1		
Bank Den (origin unknown)	1		
Beaver Bank den	8	12	12
Beaver Lodge	3	2	3
Beaver Lodge (active)	2	2	2
Beaver Lodge*	1		
Natural Bank Den	1	2	2
Beaver Bank den	1	1	1
Beaver Lodge	1	1	1
Beaver Lodge* (active)	2	1	1
Beaver Bank den	1	1	1
Beaver Lodge (active)		3	3
Beaver Lodge (active)		1	1
Beaver Bank den*		1	1
Beaver Bank den		1	1
Beaver Lodge (active)		1	1
Beaver Lodge		2	2
Beaver Bank den*		1	
Beaver Bank den		2	2
Beaver Lodge (active)		1	1
Stump and Logpile		1	

*Den site previously used by unrelated instrumented otter.

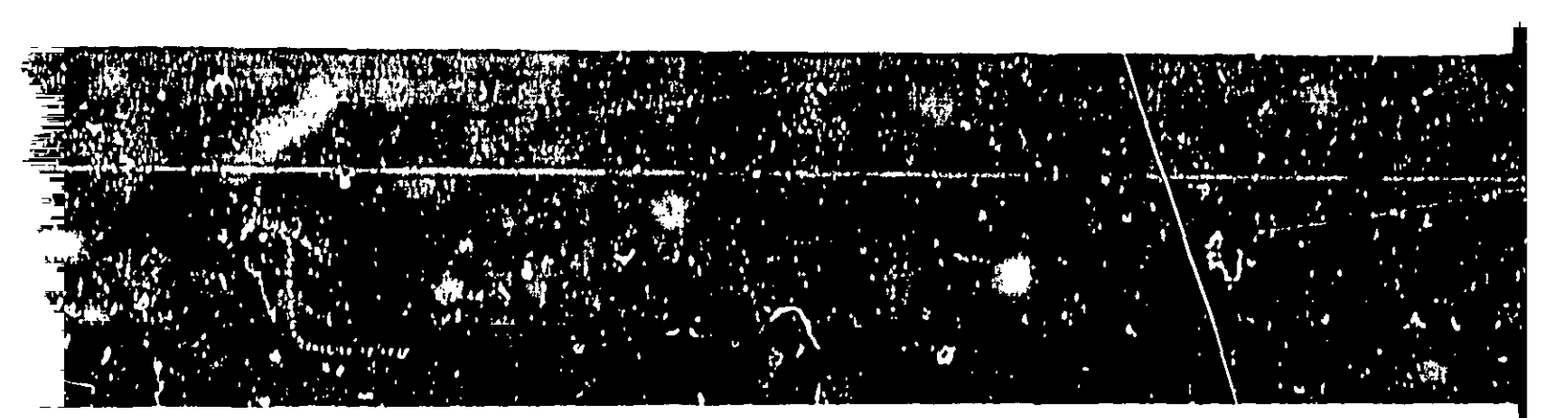


Table 5. Den sites and resting areas used by instrumented otter on the Lake Fork Creek drainage, July-December 1978.

Description		Days Used F-31	M-32	M-33
Muskrat Den		1		
Beaver House (active)		9		
Riparian vegetation		1		
" "		1		
Small logjam/willow clump		1		
Logpile		1		
Muskrat den		1		
Logpile		1		
Riparian vegetation/logs		3		
Muskrat den		11		
Muskrat Den		1		
Bank Den			1	
Beaver Lodge			2	2
Beaver Lodge			1	
Natural Bank den			2	
" " "			1	
" " "			2	
Brush Pile			1	
Beaver Lodge (active)			1	
Logjam Den A	ULF Logjam		16	8
Logjam Den B	ULF Logjam		8	22
Logjam Den* C	ULF Logjam		3	3
Logjam Den* D	ULF Logjam		11	10
Logjam Den E	ULF Logjam		5	4
Logjam Den F	ULF Logjam		3	4
Bank Den (origin unknown)			1	
Natural Bank Den			2	2
Beaver Bank Den			6	8
Natural Bank Den			1	
" " "				1

*Den site previously used by unrelated instrumented otter.

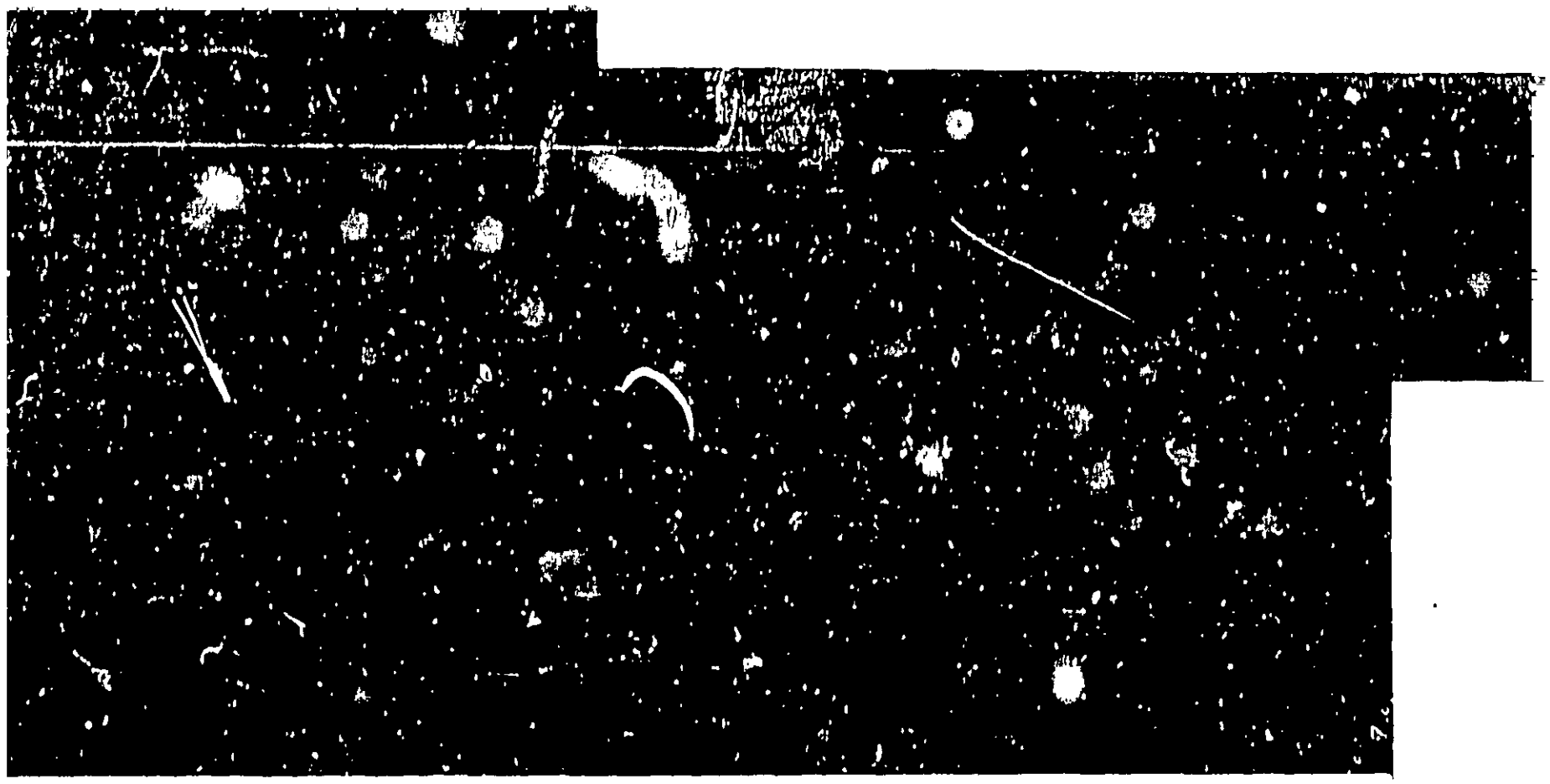


Table 6. Den sites and resting areas used by instrumented mink, July-December 1978.

Description	Lake Fork Creek Drainage		Payette River Drainage
	Days Used		
	M130	M134	M122
Bank beaver den			2
Riparian Vegetation (dogwood)			1
" " "			1
" " (willow)			1
Rock Crevice	1	4	
Earth den under boulder	4		
Log pile	1	1	
Riparian vegetation (dogwood)	1	2	
Logjam den A (ULF Logjam)	1	4	
Logjam den B (ULF Logjam)	2	1	
Logjam den C (ULF Logjam)	3	3	
Logjam den D (ULF Logjam)	2	3	
Logjam den E (ULF Logjam)		1	
Rock crevice	4		
Earth den under fallen tree	1		
Natural bank den	1		
Earth den under tree roots	2		
Road rip-rap	1		
Earth den under boulder		3	
Brush pile		1	
Under cut bank/riparian vegetation		1	
Road rip-rap		2	
Earth den under boulder		2	
Earth den under log		3	

processed. One mink was actually caught by hand, offering little resistance. The extent of mortality due to sickness has not been determined.

Plans for Next Six Months:

Trapping will continue for mink and otter when weather permits. Radio transmitters will be implanted in captured otter. Several mink at selected sites will be outfitted with radiocollars. Scat collection and analysis will continue. Instrumented animals will be monitored on a daily basis when possible. Movements, activity patterns and habitat preferences will be recorded. Investigation of the relationship between mink and otter on the study area will continue.

* * * * * * * * * * *

Project WU-112: Reproduction, Food Habits and Movements of Great Blue Herons in southern Idaho

Investigator: Nancy M. Warren

Advisor: Maurice Hornocker

Cooperators: The Nature Conservancy, National Wildlife Federation, Idaho Department of Fish and Game

Objectives:

1. To obtain information concerning breeding biology, including nesting phenology and reproductive success.
2. To ascertain habitat use by resident birds.
3. To determine the numbers and distribution of over-wintering birds.
4. To analyze food habits.
5. To identify causes of mortality of resident birds.

Status:

Field work completed. Thesis is in preparation.

* * * * * * * * * * *

Project WU-115: Analysis of predator-prey interactions on the Salmon Tract, Twin Falls County, Idaho

Investigator: Michael C. Todd

Advisor: Maurice Hornocker

Summer Assistant: Randall M. Olson

Project Support: U.S.D.I. Bureau of Reclamation; Idaho Department of Fish and Game

Objectives:

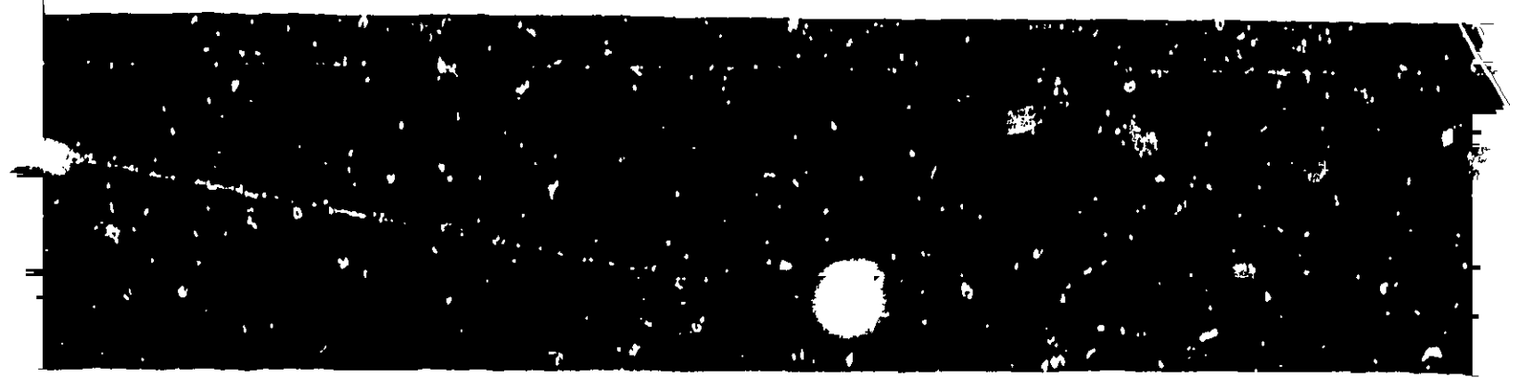
1. Measure badger abundance and activity within various cover types.
2. Describe the sex ratio, age structure, natality, and mortality of the badger population.
3. Delimit badger home ranges, movement patterns, and distribution.
4. Analyze badger food habits.
5. Inventory raptorial species.
6. Determine relative abundance of coyotes and other carnivorous species.

Progress:

Badger Captures

During the months of July and August, 46 (*Taxidea taxus*) were captured or recaptured 67 times. A total of trap nights yielded 21 male and 20 female new captures; 3 males and 2 females were captured by hand. For the entire 1978 field season, a total of 84 badgers was captured 118 times (Table 1). Overall capture/recapture rate was one badger per 8.8 trap nights.

Twenty-seven of the animals captured in July and August were subjectively aged as adults or yearling animals according to tooth wear, weight, and general appearance; this included 16 males and 11 females. Ten of the 11 females (91%) showed evidence of recent lactation as determined from blackening and slippage of hair around teats. All 16 adult males had large scrotal testes and appeared to be in full breeding condition during these months. Some males captured in June were also scrotal; this agrees with data presented by Wright (1969) that male badgers appear to be fertile from about the first of June until late August. Two females captured in June showed slight swelling of the vulva. All 11 females captured in July and August were in breeding condition as evidenced by swelling of the vulva; maximum swelling



was noted in mid-to-late July and in August. In addition, 3 females originally captured prior to 1 July also showed vulva swelling in July and August upon recapture.

Nineteen young-of-the-year (YOY) badgers were captured in the second half of the 1978 field season. These animals were subjectively aged by tooth wear, eruption of permanent teeth, plus weight and general appearance. Eight male and 11 female YOYs were captured in July and August. No YOY males were scrotal in late summer; Wright (1969) noted that male badgers reach sexual maturity at 14 months of age. Examination of ovaries from two YOY female carcasses showed no signs of corpora lutea or corpora albicantia; however, 6 of the 11 YOY females (54%) did have swollen vulvas, and four of them were markedly swollen in August. Wright (1969) states that there is some evidence that a small proportion of 4-month old females may breed.

Habitat Use

Badgers exhibited a high use of areas on which the vegetation consisted of annual grasses and forbs; 36 of 67 captures and recaptures (54%) in July and August were in such areas. These simple plant communities consisted mainly of wild mustards (*Sisymbrium* sp.) and cheatgrass (*Bromus tectorum*). Twelve captures/recaptures (18%) occurred in stands of crested wheatgrass (*Agropyron cristatum*); seven (10%) were in mixed stands of big sagebrush (*Artemisia tridentata*) and annual grasses and forbs, and six (9%) were in crops of cultivated or seed alfalfa (*Medicago* sp.). Badgers were also taken in mixed stands of rabbitbrush (*Chrysothamnus nauseosus*) with annual grasses and forbs (4%), mixed crested wheat with annual grasses and forbs (3%), and pure rabbitbrush (1%).

Carcass Collections

Eighteen badger carcasses were collected during July and August. Eleven of these (61%) were obtained from local residents, and the remaining 7 (39%) were road-killed animals; one road-killed animal was too mutilated to sex or age. There were 9 adult males, 2 adult females, 4 YOY males, and 2 YOY females in the carcass collection. The high percentage of adult males (50%) in the sample may be indicative of the increased wanderings in search of females during the breeding season, thus exposing themselves to more hazards. Three of the 7 road-kills were marked animals--2 adult males and one adult female.

In late August, I distributed 240 letters to residents on the Salmon Tract, to local furbuyers, and to Idaho Fish and Game personnel; these letters were for the purpose of collecting carcasses during my absence from the study area this past winter. Individuals were requested to report road-kills and trapped or shot badgers to local assistants who would then pick up the carcasses and freeze them until my return to the study area.

Badger Food Habits

Thirteen stomach samples were obtained from carcasses collected during the 1978 field season. Belding's ground squirrels (*Spermophilus beldingi*) occurred in 10 of the 13 samples analyzed; deer mice (*Peromyscus maniculatus*) and unidentified cricetid mice were in two samples each. Food items found in only one stomach each included the following: northern pocket gopher (*Thomomys talpoides*), meadow vole (*Microtus* sp.), Ord's Kangaroo rat (*Dipodomys ordii*), cottontail rabbit (*Sylvilagus* sp.), bovid carrion, and lamellicorn, or scarab, beetles of the family Scarabaeidae. Three stomachs contained parasitic helminths, *Ascaris columnaris*, a nematode species also reported by Leiby et al. (1971) as occurring in badgers in North Dakota.

A total of 71 scats was collected in 1978, but these have not yet been analyzed for food habits information.

Raptor Segment

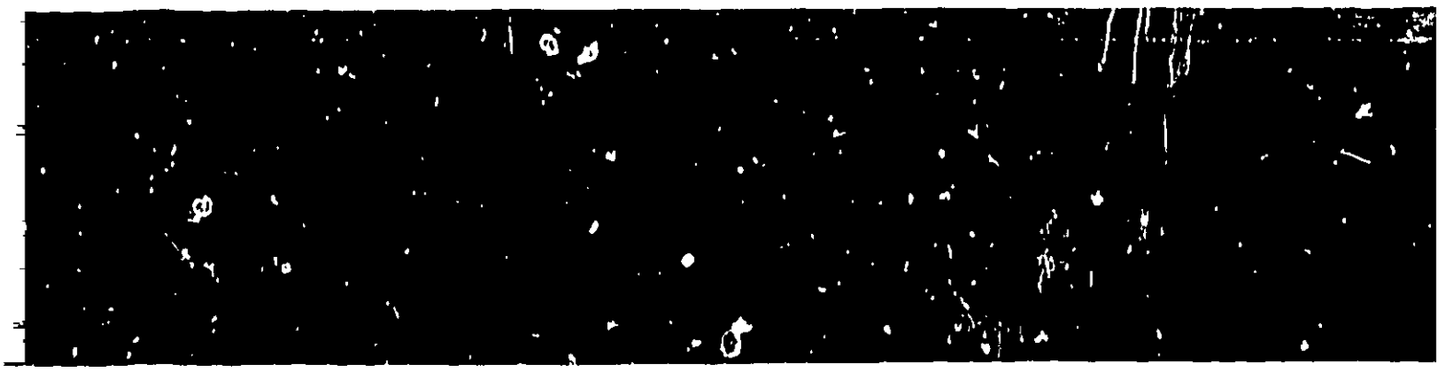
One raptor census route was conducted in July; time did not permit me to conduct a census in August.

Fledging success of great horned owls (*Bubo virginianus*), ferruginous hawks (*Buteo regalis*), and Swainson's hawks (*Buteo swainsoni*) was obtained. Three of the four great horned owl pairs fledged an average of 2.3 young. All pairs observed had a clutch of three eggs but only two eggs in two of the clutches hatched, one being addled and the other destroyed or stolen. The third nest had 100 percent success in hatching and fledging. If a search within a 50 yard radius of the nest failed to reveal any dead young, it was assumed the young had fledged. Swainson's hawks were the most numerous raptors nesting on the Salmon Tract; an average of 2.23 young were fledged from the 13 nests observed. Most nest trees were not climbed for safety reasons; Swainson's hawks tended to position their nests in the upper-most reaches of the trees. Five ferruginous hawk pairs fledged an average of 1.8 young.

Coyote Segment

Coyote (*Canis latrans*) scent station lines were established in August. A total of 15 scent station lines of 10 stations each were established on the upper and lower Salmon Tracts. Each scent station consisted of a 3-foot diameter circle of sifted earth with a perforated capsule containing a fatty-acid scent in the center. Coyote and badger visitations were recorded by the presence of tracks within the circle. If more than 50% of a station was unreadable, it was considered inoperable. Out of a total of 150 scent stations set out for one night, only four were destroyed. A total of 24 coyote visitations were recorded for the 146 stations yielding an index of 164, using the formula

$$\frac{\text{Total No. Visits}}{\text{Total No. Operable Station Nights}} \times 1000 = \text{Index}$$



During the entire 1978 field season, a total of eight coyotes was observed. No coyotes were observed on the Lower Salmon Tract and spotlighting efforts throughout 1978 did not yield any coyote observations.

The index for badgers from scent stations was 103, from 15 visitations per 146 stations nights.

Other Comments

The investigator completed all required course work in December of 1978.

Plans for Next Six Months

1. Continue trapping efforts on badgers.
2. Continue raptor surveys and gathering nesting data.
3. Analyze remainder of data from 1978 field season.

Literature Cited

Leiby, P. D., P. J. Sitzman, and D. C. Kritsky. 1971. Studies on helminths of North Dakota II. Parasites of the badger, *Taxidea taxus* (Schreber). Proc. Helminth. Soc. Wash. 38(2):225-228.

Wright, P. L. 1969. The reproductive cycle of the male American badger (*Taxidea taxus*). J. Reproduction and Fertility, Suppl. 6. pp. 435-445.

* * * * * * * * * *

Table 1. Numbers and classification of badgers captured on the Salmon Tract, April-August 1978

Method	Captures		Recaptures		Total Captures & Recaptures
	♂♂	♀♀	♂♂	♀♀	♂♂ & ♀♀
Trap Nights (1041)	43	31	15	19	108
Daytime Hand Captures	5	5	0	0	10
Totals	48	36	15	19	118

Total of 84 badgers captured 118 times

WU-116: Identification of redhead production areas in southeast Idaho and eastern Washington

Investigator: Elwood G. Bizeau

Field Assistants: Steven Hemenway, Kenneth Mackenzie

Project Support: U.S. Fish and Wildlife Service

Objective:

Identify, classify and map wetlands important to redhead production in eastern Washington and southeast Idaho.

Status:

The surveys of redhead production areas in southeastern Idaho and eastern Washington were completed by mid-August. Abstracts follow:

IDAHO

Wetland Description Worksheets were prepared for 100 privately owned wetlands in southeastern Idaho and quality ratings were assigned to each. Only privately-owned wetlands considered suitable for redhead duck nesting were included in the survey.

Based on observed pairs and broods, redheads in southeastern Idaho exhibited a definite preference for hardstem bulrush (*Scirpus acutus*) over any other type of persistent emergent vegetation.

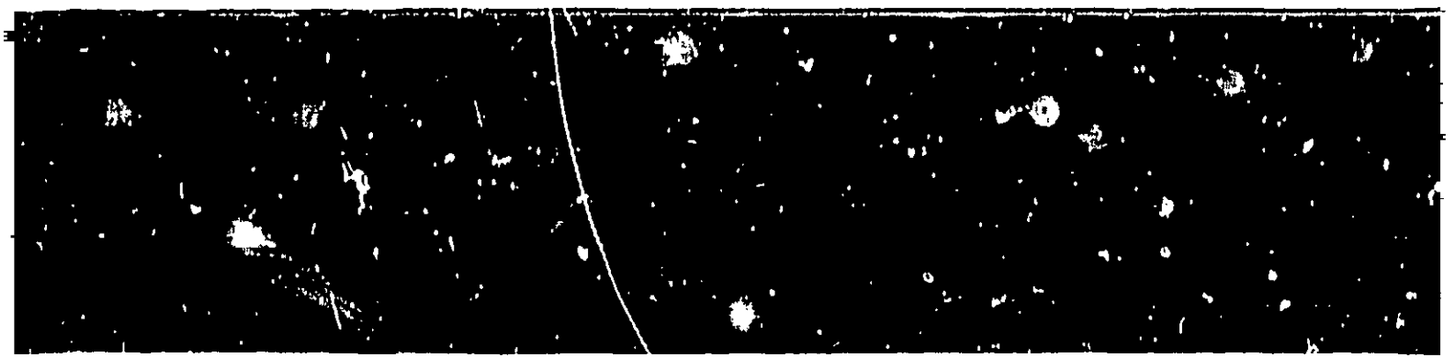
Redhead nesting habitat occurred mainly in eight counties of southeastern Idaho. These counties, in order of importance, were: Bear Lake, Franklin, Bingham, Bannock, Fremont, Caribou, Jefferson and Madison. Best redhead wetlands in each of the eight counties were identified and discussed briefly.

Main centers of high quality nesting habitat on private lands were:

1) The vicinity of Bear Lake NWR in Bear Lake County,
2) The northern part of Franklin County,
3) The vicinity of American Falls Reservoir in Bingham County.

The limited data collected on redhead production in southeastern Idaho over the past decade were considered to be inadequate to identify trend.

The only redhead wintering area in Idaho of any consequence is located in Bonner County in the Panhandle; it annually hosts one of the major wintering redhead concentrations in the Pacific Flyway.



WASHINGTON

Visits were made to a total of 1,106 individual wetlands located on private lands, of which 408 were found to be suitable redhead nesting habitat, while 698 were not. Wetland Description Work sheets were prepared for all wetlands considered to be suitable for redhead nesting and quality ratings were assigned to each.

Redhead nesting habitat surveyed on private lands totaled 9,330 acres. In addition several visits were made to a large complex (25,527 acres) of publicly-owned wetlands in Grant County, consisting of Potholes Reservoir, the wasteways emptying into it and upper Crab Creek. Much of the Potholes-Wasteways complex is potential redhead nesting habitat but not extensively used by redheads because of heavy carp infestation.

Redhead nesting is almost entirely confined to seven counties. These are, in order of importance: Spokane, Lincoln, Whitman, Grant, Adams, Douglas, and Okanogan counties.

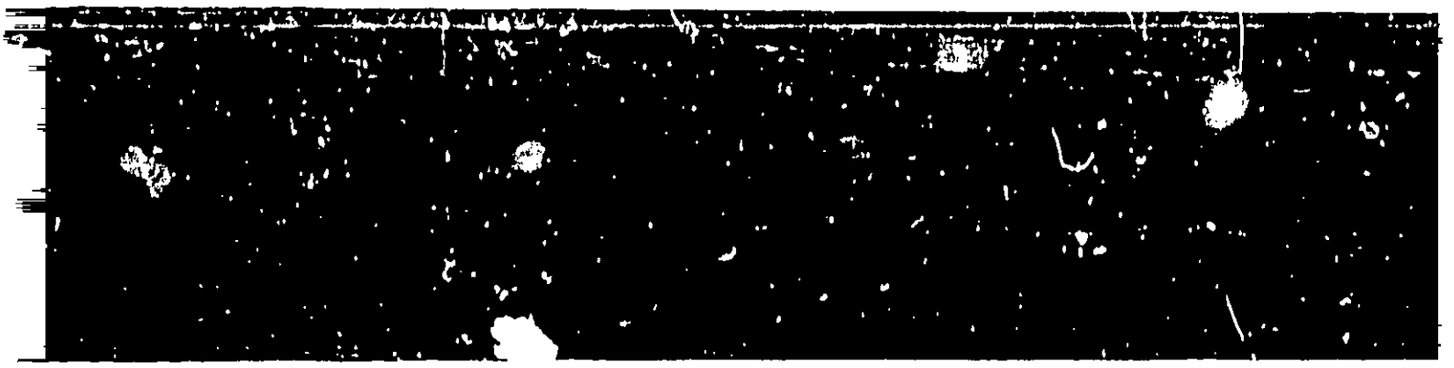
On private lands, two main centers of the best nesting habitat were identified: (1) the channeled scablands of west central Lincoln County and (2) the channeled scablands of S. W. Spokane, S. E. Lincoln, N. E. Adams, and N. W. Whitman counties.

Redheads in eastern Washington exhibit a definite preference for nesting in hardstem bulrush (*Scirpus acutus*) over any other type of persistent emergent vegetation.

Trend count data on spring redhead numbers and on production for the past several years collected by state and federal personnel indicate a sharp drop in redhead breeding population in eastern Washington in 1978 following the drought year of poor production in 1977.

A minor amount of redhead wintering occurs in eastern Washington, mostly in the Wells Pool area at the junction of the Okanogan and Columbia Rivers.

* * * * * * * * * * *



Project WU-117:	Movement Patterns and Determinants of Habitat Use for Mule and White-tailed Deer in northern Idaho
Investigator:	Thomas E. Owens
Summer Assistant:	Tim Meyers
Advisor:	James M. Peek
Project Support:	McIntire-Stennis

Objectives:

1. Determine environmental parameters which significantly affect deer habitat selection.
2. Predict habitat selection patterns from parameters which affect deer habitat use.
3. Determine movement patterns of deer.

Progress:

In this period, radiotracking of one yearling doe white-tailed deer has yielded 167 usable radio locations for habitat analysis. All other radio collars which were attached to deer have failed.

Baiting of deer with alfalfa hay was initiated 10 December at two sites suitable for rocket net operation. Deer use of these sites has been heavy and trapping will begin upon delivery of radio collars.

Weather data have been collected from eight stations to investigate microclimate differences between various topographic positions and aspects.

Currently the radio collared deer and weather stations are being monitored and synthesis of habitat analysis field forms continues.

Plans for Next Six Months:

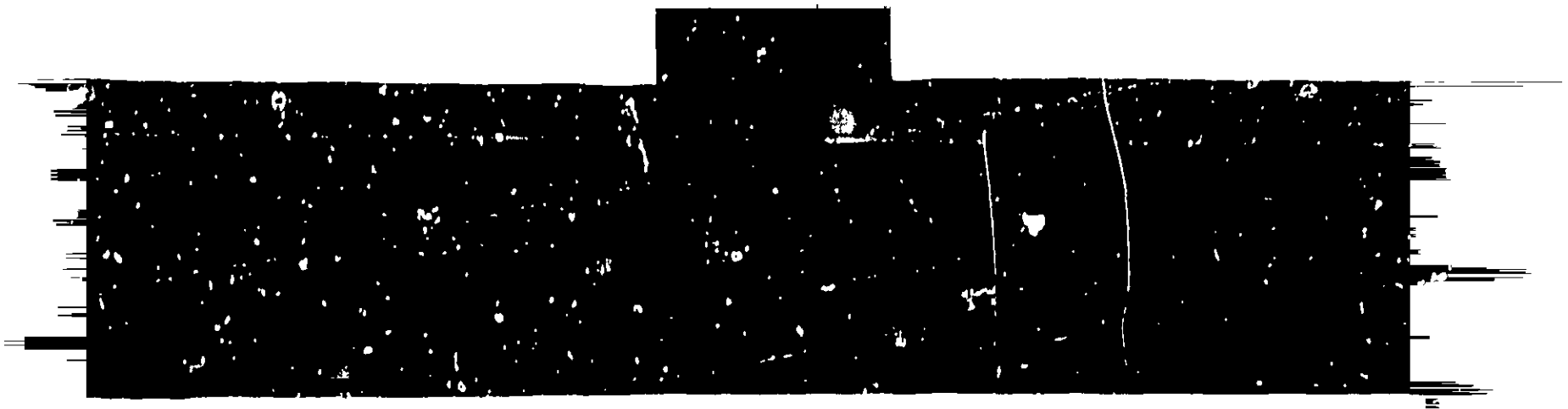
1. Continue radio tracking collared deer.
2. Continue monitoring weather stations.
3. Continue synthesis of habitat analysis field data.
4. Continue habitat analysis of radio location sites.
5. Trap and radio collar additional deer upon delivery of transmitters.

* * * * * * * * * *

MISCELLANEOUS

12-13 July	Bizeau participated in Rocky Mountain Canada goose subcommittee meeting at Jackson Hole, Wyoming with 18 persons present.
13-14 July	Garton gave paper on "Implications of Optimal Foraging Theory for Insectivorous Forest Birds" in symposium on the Role of Insectivorous Birds in Forest Ecosystems at Stephen Austin University, Nacogdoches, Texas. 350 attendees.
31 July	Peek reviewed elk-logging studies at meeting of federal and state forestry personnel at Coeur d'Alene, Idaho. 50 attendees.
31 July, 30 August, 3 October	Bizeau served as member of Governor's Task Force on Wildlife Funding for series of three meetings at Boise, Idaho.
7-8 August	Drewien assisted Canadian Wildlife Service personnel banding whooping cranes in Wood Buffalo National Park, NWT, Canada.
14-18 August	Kessler gave paper on "Responses of Coastal Prairie Vegetation and Attwater Prairie Chickens to Range Management Practices" to International Rangeland Congress at Denver, CO.; 700 attendees.
25 August	Hornocker attended S. Peterson's Faculty, Staff and Student pig roast, Troy, Idaho. 75 attendees.
2 October	Hornocker presented lecture to student chapter, The Wildlife Society, University of Idaho.
8 October	Drewien presented talk on whooping crane research to Jackson Hole Bird Club with 40 persons present.
14 October	Kessler gave paper on "The Attwater Prairie Chicken--Endangered Grouse of the Texas Coastal Prairie" to Welder Wildlife Foundation Symposium at Corpus Christi, Texas. 400 attendees .
16 October	Hornocker presented lecture to faculty and students, University of Calgary, Calgary, Alberta.
20-21 October	Bizeau gave illustrated talk on the whooping crane research at annual meeting of Washington Audubon Society at Ellensburg, Washington with 85 persons attending.
19-20 October	Drewien presented illustrated slide talk on the foster-parent project to US-Japan Natural Resources (UJNR) Panel on Conservation, Recreation and Parks at Welches, OR. with 30 delegates present.

23 October	Hornocker presented lecture to undergraduate wildlife class, University of Idaho.
2 November	Peek discussed proposed elk and moose research for Gospel Hump area with U. S. Forest Service personnel at Grangeville, Idaho. 30 attendees.
6-8 December	Drewien presented paper on age/ratios and brood sizes in Greater Sandhill Cranes and an illustrated lecture on capturing and banding whooping cranes in Canada to International Crane Workshop, Rockport, Texas with 75 persons present.



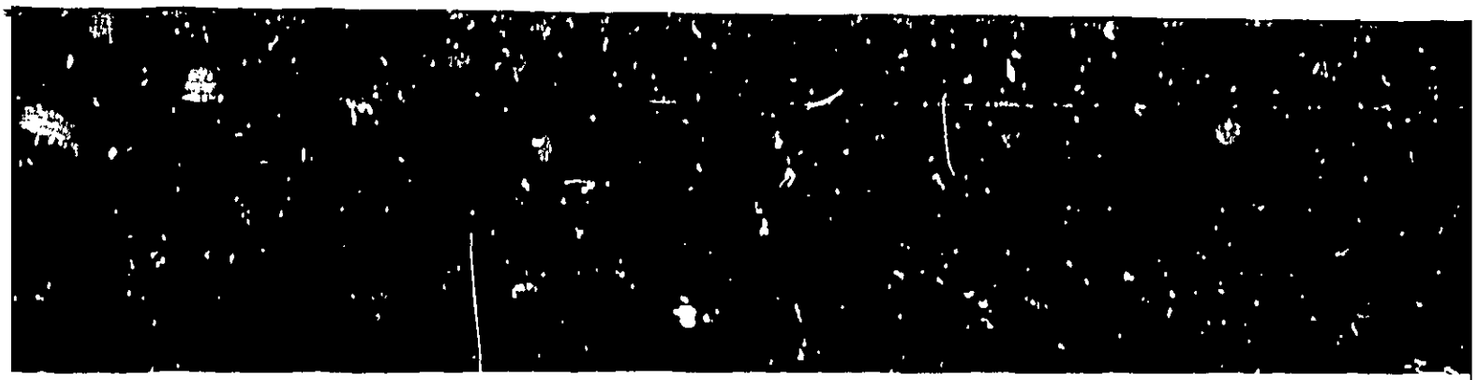
College of Forestry, Wildlife and Range Sciences

IDAHO COOPERATIVE
WILDLIFE RESEARCH UNIT
SEMI-ANNUAL REPORT

January 1, 1979 - July 1, 1979

Forest, Wildlife and Range Experiment Station

University of Idaho



VOLUME 4 NUMBER 1

SEMI-ANNUAL REPORT

IDAHO COOPERATIVE WILDLIFE RESEARCH UNIT

January - June 1979

NOT FOR PUBLICATION

This report lists the objectives, procedures, and findings of all current research being conducted under the supervision of the Idaho Cooperative Wildlife Research Unit. The data reported herein are preliminary and may be inconclusive. Permission to publish any of the contents of this report in any form is therefore withheld pending specific authorization from the Unit.

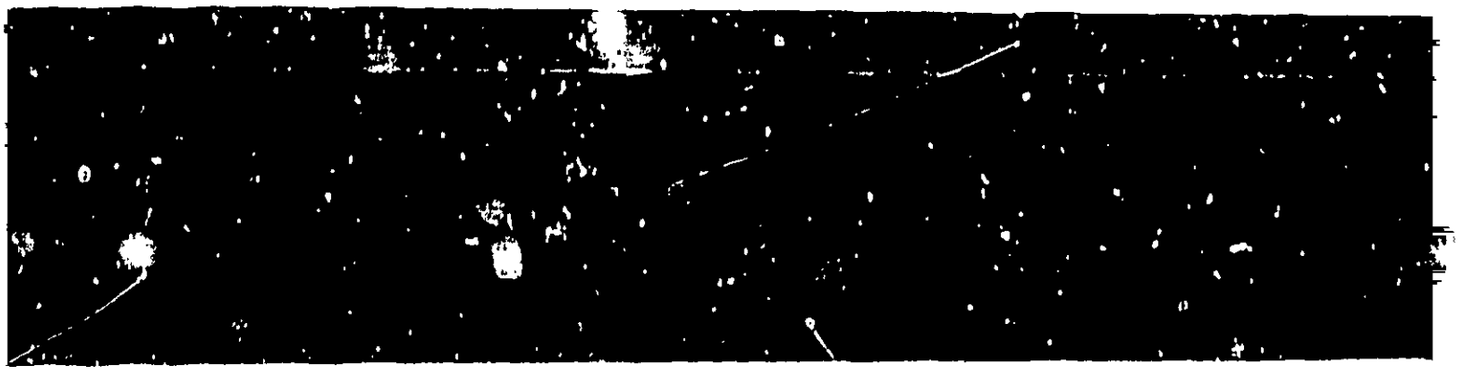
Respectfully submitted,

Maurice G. Hornocker
Unit Leader

Elwood G. Bizeau
Assistant Unit Leader

Table of Contents

*Abstract or summary of Final Report



COOPERATING AGENCIES:

Idaho Department of Fish and Game
University of Idaho
U.S. Fish and Wildlife Service
Wildlife Management Institute

COORDINATING COMMITTEE:

John H. Ehrenreich, Dean, College of Forestry, Wildlife and Range Sciences, University of Idaho
Joseph C. Greenley, Director, Idaho Department of Fish and Game
Maurice G. Hornocker, U.S. Fish and Wildlife Service

UNIT STAFF:

Maurice G. Hornocker, Unit Leader, U.S. Fish and Wildlife Service, Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho

Elwood G. Bizeau, Assistant Unit Leader, U.S. Fish and Wildlife Service, Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho

Esther L. Beymer, Unit Secretary

Roderick C. Drewien, Research Wildlife Biologist, College of Forestry, Wildlife and Range Sciences, University of Idaho

Edward O. Garton, Assistant Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho

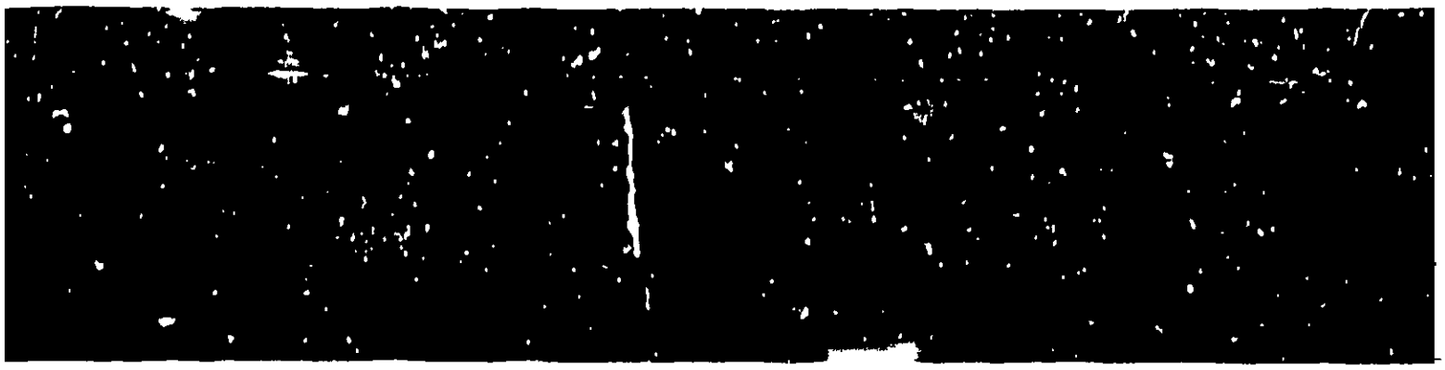
Wini Kessler, Assistant Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho

Lewis A. Nelson, Associate Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho

John P. Messick, Research Associate, College of Forestry, Wildlife and Range Sciences, University of Idaho

James M. Peek, Professor of Wildlife Management, College of of Forestry, Wildlife and Range Sciences, University of Idaho

Steven R. Peterson, Associate Professor of Wildlife Management, College of Forestry, Wildlife and Range Sciences, University of Idaho



Graduate Students	Degree Objective	Project Support
Ray P. Bosch	M.S.	U.S. Forest Service FWR Experiment Station U. of I. esearch Council
Gordon D. Bunch	M.S.	Personal
Evelyn Bull	Ph.D.	U.S. Forest Service
Dinah J. Demers	M.S.	FWR Experiment Station
Richard D. Greer	M.S.	Personal
Harry R. Jageman	M.S.	U.S. Forest Service
John F. Marshall	M.S.	Personal
Wayne E. Melquist	Ph.D.	U.S. Fish and Wildlife Service
Glen Mendel	M.S.	Personal
Joe E. Miles	M.S.	Idaho Dept. of Fish and Game
Thomas E. Owens	M.S.	McIntire-Stennis
D. John Pierce	M.S.	U. S. Forest Service
Donna E. Rounds	M.S.	Personal
Lawrence D. Roy	Ph.D.	Alberta Dept. of Agriculture
Gayle M. Sitter	M.S.	U.S. Bureau of Land Management
Michael C. Todd	M.S.	U.S. Bureau of Reclamation
Nancy M. Warren	M.S.	Nature Conservancy
Jack S. Whitman	M.S.	U.S. Fish and Wildlife Service
Jeff Yeo	M.S.	Idaho Dept. of Fish and Game

Project WU-103C: The Effects of Rest-Rotation Grazing System Upon Wildlife Populations Inhabiting the East Fork of Salmon River, Idaho

Investigator: Jeff Yeo

Summer Assistant: John Cook

Advisor: James M. Peek

Project Support: Idaho Department of Fish and Game; U.S. Forest Service

Objectives:

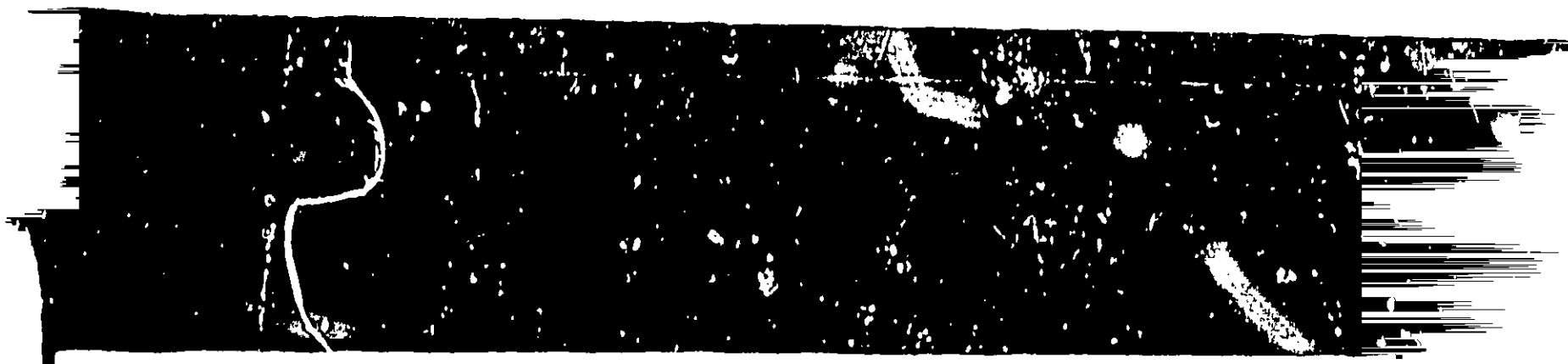
1. Describe range use patterns for mule deer, elk, and cattle.
2. Determine food habits for mule deer, elk, and cattle by availability of forage.
3. Relate 1 and 2 to cover type, plant phenology, range condition, pasture within the system, and season of use.
4. Outline the population dynamics for mule deer and elk.
5. Quantify the vegetation changes brought about by the grazing system.
6. Determine if forage or land use competition exists between mule deer, elk, and cattle within the grazing system.

Progress:

Range Distribution

Thirteen fixed-wing flights, an established vehicle route, and numerous random ground observations were used to determine range use patterns during this period. Data were compiled from 366 observations of 2295 mule deer, 80 observations of 431 elk, and 23 observations of 543 cattle.

Deer predominantly used elevations of 7000-8000 feet and the associated Artemesia tridentata var. vaseyana/Agropyron spicatum/Poa spp (A/A/P) and Artr./Agsp/Festuca idahoensis (V/A/F) cover types during January and February. In March and April, shift to Artr. var. wyomingensis/Agsp (W/A) and Artr. w./Agsp/Poa sanbergii (W/A/P) types occurred probably in response to crusted snow and the initiation of "green-up" at lower elevations (6000-7000 feet). Most deer moved to higher elevations in May and arrived on their summer ranges by early June; deer used mostly those areas showing little appreciable aspect i.e., high benches, ridgetops, and draws.



Wintering bulls and a female band were the only elk using the study area during the period January-April. Elevational use varied from 7000-9000 feet on a variety of aspects, ridgetops, benches, and draws. The V/A/F, V/A/P, and Cercocarpos ledifolius and Artemesia tripartita (Artrip) cover types received the heaviest use. Elk cows returned to summer ranges on the study area from their wintering area near Willow Creek summit in mid-May. During May and June, 8000 to 9000 foot elevations were used on V/A/F and Riparian cover types on high benches (V/A/F) and draws (Riparian).

Cattle entered the lower segment of Pasture II on 15 June. Riparian areas were used predominantly at elevations ranging from 5800-8000 feet. Use also concentrated on an Artrip type at the head of Spring Gulch.

Food Habits

Shrubs contributed the major portion of the diet of deer from January through March (Table 1. Prominent shrub species were Artemesia tridentata var.wyomingensis and Artemesia tripartita. Following "green up" in late March, deer shifted to grasses in April, a somewhat equal use of all three taxa in May, and shrubs and forbs in June. Major grasses utilized by deer were Agropyron spicatum and Poa sandbergii. Crepis spp. and Astragalus spp. were the major forbs used.

Agropyron spicatum and Poa spp. made up the largest portion of elk diet through May. In June, possibly due to the very dry spring, elk took more forbs into their diet (61.88%) because forbs tend to retain their succulence longer than grasses. The forbs used were almost entirely of the Composite family.

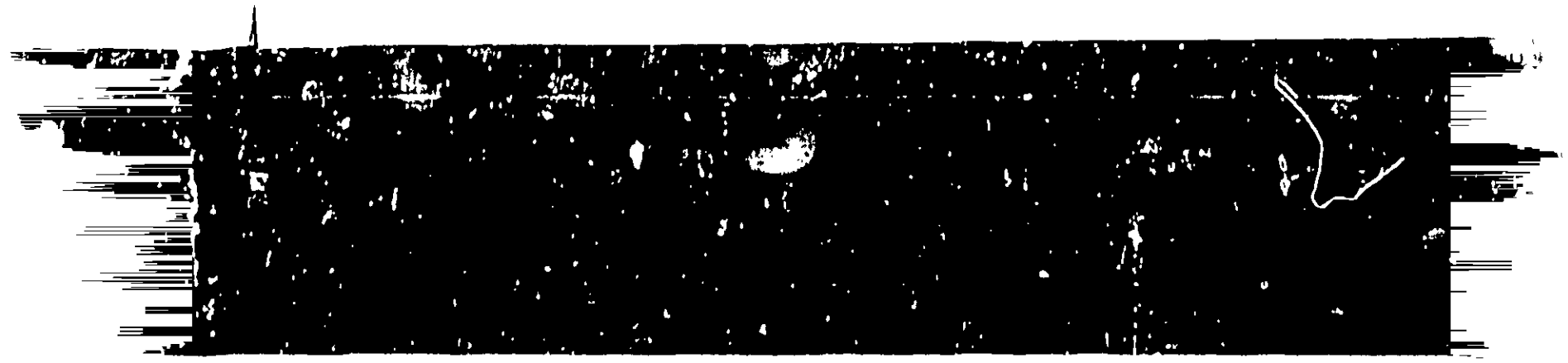
Over 96% of the diet of cattle were grasses. Grasses utilized were: Poa spp., Festuca idanoensis, Oryzopsis hymenoides, and Agropyron spicatum.

Recording of plant phenology was initiated 21 March on feeding sites and 18 April at established phenology sites.

Marked Animals

Eighteen elk were trapped this winter at the Willow Creek trap. Thirteen animals were marked with ear tags and either number or radio collars. Four animals either escaped through the sides of the trap or were released unmarked. One mature cow (#51), trapped 14 February 1978, was retrapped on 3 March 1979. A radio collar which apparently slipped off was returned from south of Willow Creek summit by Terry Williams, conservation officer for the Department of Fish and Game. Radio contact with transmitter-equipped elk has not been established, but visual observations have been made on ten of the marked elk.

Three mule deer were fitted with high-frequency transmitters



this spring. Contact on all three was lost after 17 May due to receiver problems. Two other deer (C4 & C6) are still being monitored. C6 returned to the same summering area in Germainia Creek which she utilized in 1978. C4 moved into Hell Canyon, about 3.5 miles from areas used at this time in 1978. Sightings were also made on three collared deer whose transmitters are inoperative.

Plans For Next Six Months:

1. Continue gathering range distribution data, examining feed sites, and monitoring movements of marked animals.

2. Continue recording plant phenology until the end of the growing season.

3. Begin examination of condition -trend sites within the various cover types, on a proposed prescribed burn, past burns, and sagebrush control areas.

4. Begin assessment of plant utilization following cessation of grazing by cattle in each pasture.

* * * * * * * * * * *

Table 1. Ungulate food habits by percent instance of use, January-June, 1979.

	January	February	March	April	May	June
MULE DEER						
	1239(5)[a]	1453(5)	1567(6)	1790(8)	1725(7)	772(4)
Shrub	85.15	85.13	58.71	5.92	32.75	47.57
Forb	12.51	14.11	19.02	2.35	41.45	51.68
Grass	2.34	0.76	22.27	91.73	25.80	0.65
ELK						
	469(2)	1439(5)	912(4)	1205(4)	1466(4)	2453(7)
Shrub	19.83	39.94	61.62	0.58	0	0.90
Forb	0	12.58	1.54	15.10	7.09	61.88
Grass	80.17	49.48	36.84	84.32	92.91	37.22
CATTLE						1670(3)
Shrub	--	--	--	--	--	0
Forb	--	--	--	--	--	3.11
Grass	--	--	--	--	--	96.89

[a] Number of instances of use followed by number of feeding sites. All other figures in Table are percent.

Project WU-104:	Ecology of Badgers on the Snake River Birds of Prey Natural Area, Idaho
Investigator:	John P. Messick
Advisors:	Maurice Hornocker; Ian McT. Cowan (University of British Columbia)
Cooperators:	Department of Zoology, The University of British Columbia; Bureau of Land Management; Idaho Department of Fish and Game
Project Support:	U.S. Bureau of Land Management

Objectives:

1. Attempt to ascertain the density, sex and age structure, and other population parameters of badgers (Taxidea taxus) on the Snake River Birds of Prey Area, Idaho.

2. Explore the strategy of habitat use and describe the social organization of the badger population.

3. Gather information on the food habits of badgers as an aid to estimating the impact of this predator.

4. Collect information on the food habits of other important carnivores coyotes (Canis latrans) and bobcats (Lynx rufus).

Status:

Field work completed. Dissertation is in preparation.

* * * * * * * * * * *

Project WU-107:	Experimental Reestablishment of Whooping Cranes in Western United States
Investigator:	Roderick C. Drewien, Research Wildlife Biologist
Project Support:	U.S. Fish and Wildlife Service
Supervision:	Elwood G. Bizeau
Cooperators:	Canadian Wildlife Service, U.S. Fish and Wildlife Service, Colorado Division of Wildlife, Idaho Department of Fish and Game, Montana Department of Fish and Game, New Mexico Department of Game and Fish, Utah Division of Wildlife Resources, Wyoming Game and Fish Department

Objectives:

1. In cooperation with the Canadian Wildlife Service, annually transplant eggs from wild whooping crane nests at Wood Buffalo National Park in the Northwest Territories to the nests of selected color-marked sandhill crane foster-parents at Grays Lake NWR in Idaho.

2. Monitor nesting, hatching, rearing and behavior of the transplanted eggs (chicks) at Grays Lake; color-band juveniles.

3. Follow migration of foster-parent families and subadults to fall staging area in the San Luis Valley of Colorado and to wintering grounds along the Rio Grande River in New Mexico.

4. Monitor movements, activities and behavior of foster-parent families and sub-adults during the fall and winter in New Mexico.

5. Follow spring migration of sub-adults north and monitor their activities and behavior on summering areas.

Progress:

This report covers the period January through June, 1979.

Spring Migration

Nine whooping cranes, including three juveniles, were located in the Rio Grande Valley, New Mexico, during the fall of 1978-79 and eight wintered there. One bird, a juvenile, departed with its foster parents from Bosque del Apache NWR in November and was later found in northwestern Chihuahua, Mexico. All whoopers migrated from the wintering grounds between 19 February - 7 March. A major migration from New Mexico occurred on 25 February when a minimum of four whoopers migrated north, including the bird which had wintered in Mexico.

Eight whooping cranes were located in the San Luis Valley, Colorado, the principal migration stopover area. Whoopers were present there from 20 February - 9 April. These whoopers made considerable use of the Monte Vista NWR during their stay in the valley. One bird, known to have migrated from the wintering grounds, but not observed in the San Luis Valley, completed the spring migration and was later observed in southeast Idaho.

Most cranes resumed spring migration from the San Luis Valley in late March and early April. Several confirmed whooping crane sightings were made along the migration route through western Colorado and northeast Utah as the birds returned to summer areas.

The first whooper sighting at Grays Lake occurred on 5 April and by late April four whoopers were present there. A fifth bird was located near Bear Lake NWR about 70 airline miles south of Grays Lake, and appears to be summering there. Two other whoopers have been located summering in the upper Green River basin near Pinedale, Wyoming. The summer locations of the two remaining whoopers are currently unknown. A number of other unconfirmed spring sightings have been received from western Wyoming, eastern Idaho and western Montana.

1979 Production

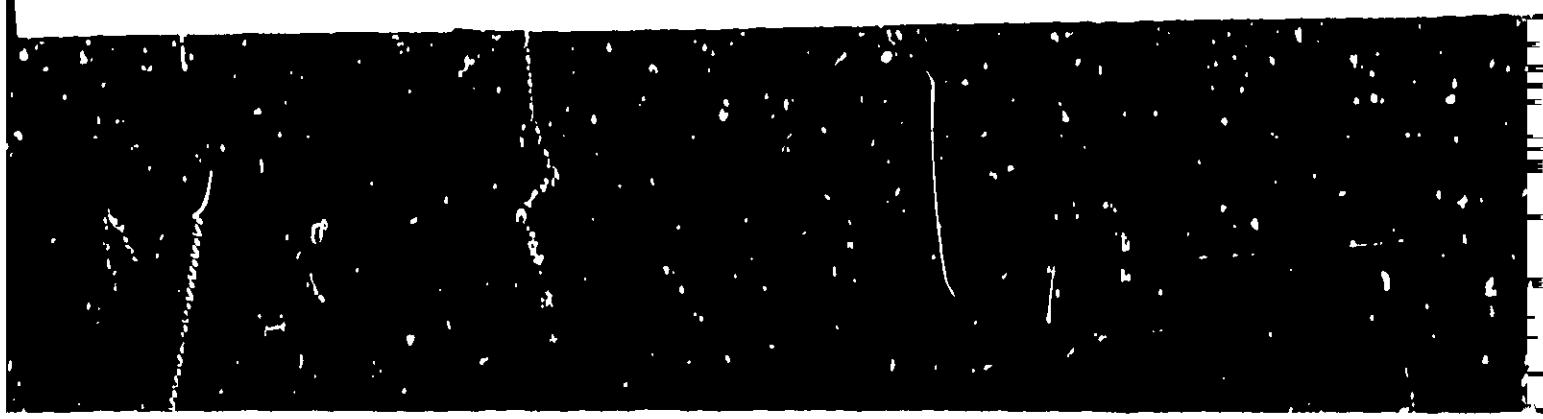
A total of 19 whooping crane eggs was transferred from wild nests in Wood Buffalo National Park, Canada, to Grays Lake NWR on 1 June. Twelve of these eggs hatched during the second week of June; the remaining seven eggs failed to hatch for various reasons including infertility, embryonic mortality and predation. Nine of the twelve Canadian chicks were known to survive to the end of June.

Five additional whooping crane eggs obtained from captive cranes maintained at Patuxent Wildlife Research Center, Maryland, were transported to Grays Lake NWR in 1979. Four of these eggs hatched between 30 May and 11 June; at least three of the four Patuxent chicks were known to be alive at the end of June.

Plans for Next Six Months:

Continue all phases of field work.

* * * * * * * * *



Project WU-110: Population characteristics and dynamics of river otter (Lutra canadensis) in west-central Idaho

Investigator: Wayne E. Melquist

Assistants: Joan Antle, Randall Olson, Kate Wynne

Adviser: Maurice G. Hornocker

Project Support: U.S. Fish and Wildlife Service, National Wildlife Federation, Idaho Department of Fish and Game, University of Idaho

Objectives

1. Determine otter population density, sex and age structure, breeding age, reproduction and mortality rates.

2. Describe seasonal activity patterns, movements and spatial distribution of otter and relate these to food habits, population size, structure and density.

3. Evaluate the dynamics of an otter population in an area with a wide range of human influence.

4. Investigate the inter-relationships of otter and mink on the study area.

Progress:

Food Habits.

Identification of prey remains in more than 1800 scats has been completed. This represents a sample from each 2-week period of the year since June 1976. Scat collection was terminated at the end of this reporting period, and analysis is near completion.

Trapping.

Conditions were favorable enough to resume trapping on 8 April. A total of 342 trap nights resulted in five captures (Table 1). All otter were captured in Hancock traps. Two otter (M34 and F35) were initially captured on 29 September 1978. When F35 was recaptured, she fought the trap violently and died the following day of a ruptured aorta. M34 is presently being held in captivity. The old transmitter will be replaced with a new one.

One beaver was captured in a Hancock trap set for otter and a mink was captured in a large Tomahawk trap. Seven Hancock traps were sprung and empty. Four traps were probably sprung by otter and the remaining three by someone molesting the trapline.

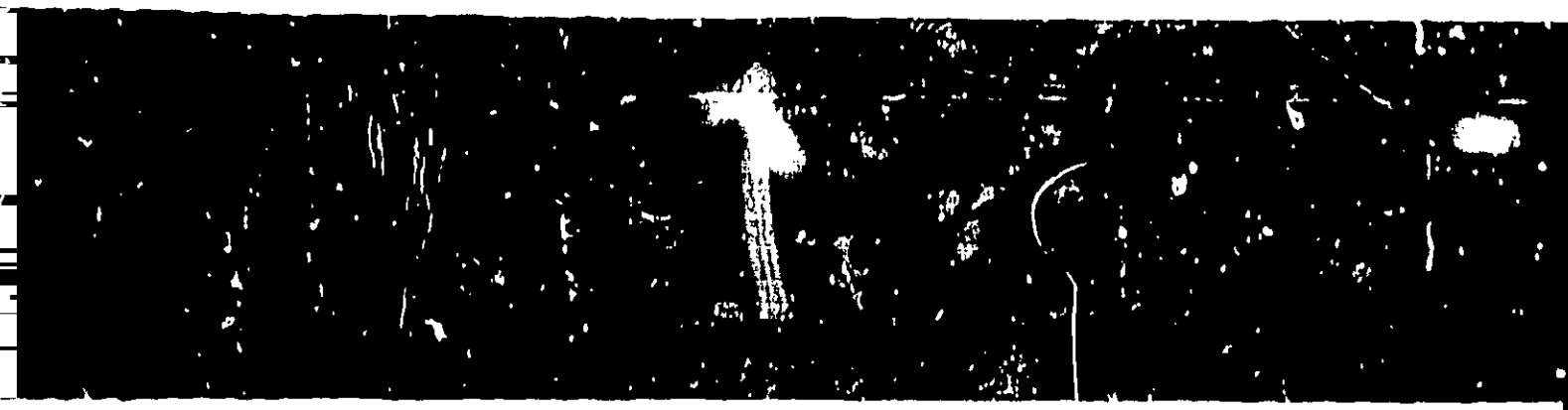


Table 1. Otter captured during the period January-June 1979.

Date	Animal No.	Sex	Age	Weight (kg)	Recapture date
4-27-79	37	M	Yearling	7.39	5-13-79
5-17-79	38	F	2 yrs. ?	8.73	--
6-12-79	36	F	Yearling	7.26	--
6-16-79	34	M	Yearling	8.09	--

Telemetry

Transmitters were implanted in two otter during this reporting period. Post-operative recovery was uneventful in both cases. F39 was released 2 days after surgery without any apparent complications. The lateral incision technique may allow release of implanted otter within hours of surgery. A brief recovery (retention) period is generally preferable.

Transmitters were recovered from M33 and F36 after being implanted for 150 days and 243 days, respectively. We found no abnormalities in the abdominal cavity of either otter as a result of the implant.

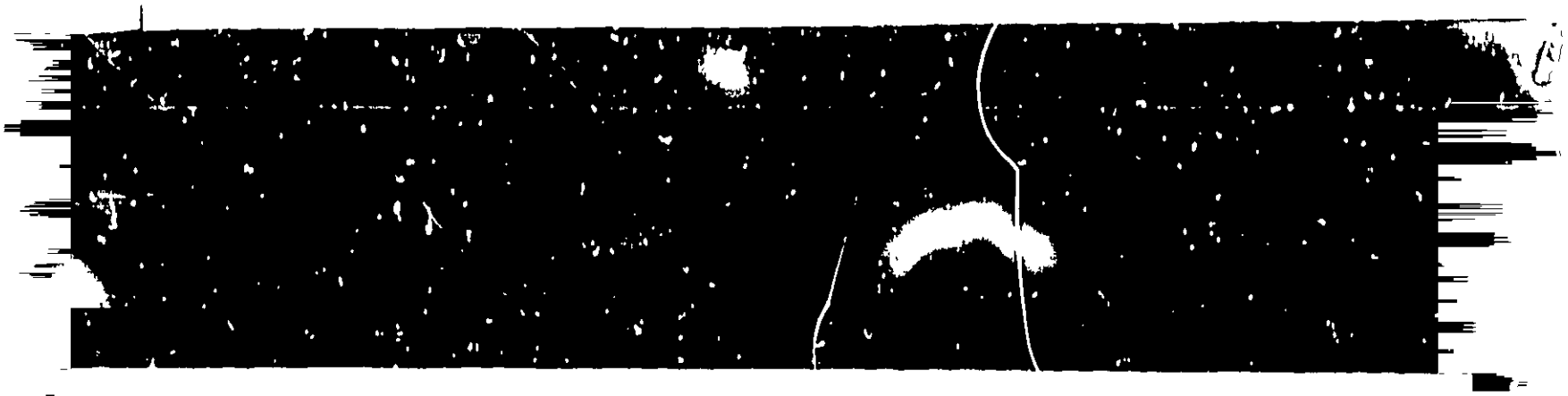
Five otter are presently carrying functional transmitters. The longest transmitting period is 268 days from M32. Transmitters in four of the five otter, including M32, are designed to transmit 12-14 months. A smaller transmitter has been implanted in the most recently captured otter (F38). This transmitter incorporates a motion switch that slows down the pulse rate or the transmitter when the animal has been inactive for at least 2 minutes. The active pulse rate has been reduced as well, resulting in less battery drain and a transmitter life of about 2 years. A similar transmitter will be implanted in M34.

Otter and Mink Interrelationships

Instrumented otter and mink occasionally occurred in the same general area simultaneously. Otter generally moved into or through the territory of instrumented mink. This did not appear to alter the activity patterns of the mink.

Movements and Dispersal

Increased movement and dispersal of young otter began during March.



Restlessness among young otter was indicated by an increase in the frequency of movements within and outside the area normally occupied. These activities were more apparent with solitary young. Increased movement, but not dispersal, also coincided with disbandment of three young (including M34 and F36) from the adult female. Onset of the breeding season was probably responsible for this breakup. Dispersal of these young did not occur until after the group had completely disbanded in early June.

A description of movements and activities is provided for the instrumented otter:

M32. During January, this animal remained in Lake Fork Creek, usually in the company of M33 and one or more untagged otter. When observed in February, he was alone. Between 1 and 6 March, M32 accompanied three otter cross-country to the Payette River. He has remained alone since March 10. Between 6 March and 9 April, M32 occupied a small feeder creek that drains into the Payette River. On 10 April, he moved upstream and entered Hait Reservoir, where he remained for 8 days. He then went cross-country over Red Ridge and was located in Big Creek (Little Salmon River drainage) on 25 April. M32 then moved downstream into Meadows Valley, where he remained until 5 May. Continuing in a westerly direction, M32 entered the Weiser River drainage. He has remained at the headwaters of the East Branch Weiser River since 10 May. His present location is about 32 km northwest and two drainages away from the initial capture site.

M34 and F36. On 19 March, M34, F36, and an untagged otter were observed traveling up a small creek. The adult female was absent from the group, which was being led by one of the instrumented otter. Since she was the dominant member of the group, her absence would probably explain why M34 and F36 had recently traveled to areas not previously visited. I estimate that the adult female probably left the group during March, prior to the 19th. The young otter remained on the Payette River for the next 2 months. Between 19 March and 15 April, the untagged otter separated from M34 and F36. On 22 May, M37 traveled from Lake Fork Creek to the Payette River and joined M34 and F36. After 2 days on the Payette River, all three otter returned to Lake Fork Creek, with M37 splitting up from the others on 25 May. M34 and F36 then returned to the Payette River on 30 May.

M34 and F36 separated for the first time on 2 or 3 June. F36 moved upstream almost to McCall, then came back downstream on 9 June. She moved downstream to Cascade Reservoir, then up Lake Fork Creek, and was recaptured there on 12 June. As F36 moved downstream, M34 headed upstream to where F36 had previously been. He remained there for 4 days, then returned downstream and entered Cascade Reservoir. He then proceeded up Lake Fork Creek and into Mud Creek for 2 days. On 15 June, M34 was recaptured on Lake Fork Creek in the same trap that captured F36. The pattern of movement suggests that M34 may have been searching for F36.

F35. F35 rejoined M34, F36, and two untagged otter on 19 November 1978. She remained with them until 29 January 1979. After separating from the group, F35 stayed in the same general area of the Payette River until

19 March, when she moved downstream almost to Cascade Reservoir. On 1 April, she entered Cascade Reservoir and remained near a small creek outlet for the entire month. On 3 May, shortly after the ice disappeared from Cascade Reservoir, she became more active. Between 10 May and 30 June, F35 traveled throughout Cascade Reservoir, Gold Fork River, Lake Fork Creek, and Little Payette Lake. Near the end of June, she went cross-country from Little Payette Lake into Payette Lake. From Payette Lake, she again entered the Payette River, but upstream from Payette Lake this time. Although F35 has traveled throughout a 60 km by 23 km portion of Long Valley, she has remained in the Payette River drainage within about 30 km of the initial capture site.

M37. This animal was released at the capture site on Lake Fork Creek on 11 May. Since that time, he traveled throughout Lake Fork Creek, Gold Fork River, and the lower sections of Boulder Creek and the Payette River (above Cascade Reservoir). M37 was observed with as many as four untagged otter. Also, he joined M34 and F36 for a short time.

F38. This otter was released on Lake Fork Creek on 11 June. She left Lake Fork Creek and has remained primarily in Boulder Creek and Gold Fork River. Recently, she was observed with two untagged otter.

Den and Resting Sites

Snow caves constructed by otter, ice crevices and cavities under the ice, and shelters created by snow-covered logs and brush were used frequently by instrumented otter during the winter and spring. These sites provided shelter for otter traveling through unfamiliar areas. A floating dock was used several times by 5 as a resting site. Typical den and resting sites (e.g. beaver lodges, bank dens, tunnels, and dense vegetation) were again used by instrumented otter after the snow disappeared.

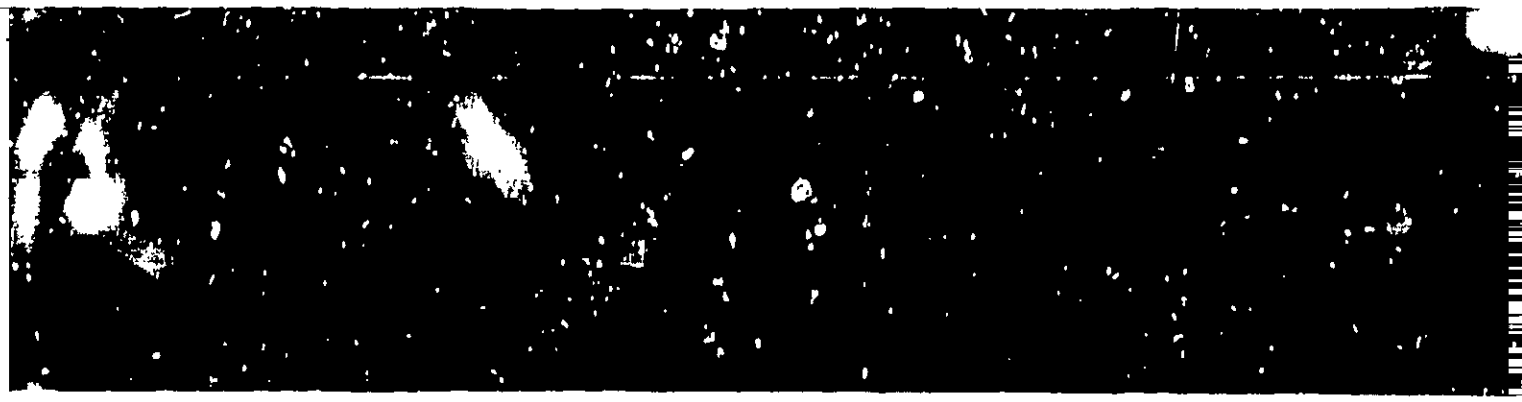
Activity Patterns

Activity data have been recorded for instrumented otter during monitoring periods. The type of activity observed was recorded in 1-hour periods. Recorded activities of otter were placed in the following categories: Active, Foraging, Feeding, Traveling, Social, Inactive, Resting, Undetermined, Other. These data are presently being summarized for instrumented otter.

Plans for Next Six Months:

General trapping will be terminated this fall. An effort will be made to recapture instrumented otter and replace old transmitters. I will continue to implant transmitters in selected otter. Scat analysis will soon be completed and food habits data summarized. Instrumented otter will be monitored on a daily basis. Movements, activity patterns, and habitat preferences will be recorded. Investigation of the relationship between mink and otter will continue through coordination with the mink project.

* * * * * * * * * *



Project WU-112: The Ecology of Great Blue Herons on Silver Creek, Idaho

Investigator: Nancy M. Warren

Advisor: Maurice G. Hornocker

Cooperators: The Nature Conservancy, National Wildlife Federation, Idaho Department of Fish and Game

Objectives:

1. To obtain information concerning breeding biology, including nesting phenology and reproductive success.
2. To ascertain habitat use by resident birds.
3. To determine the numbers and distribution of over-wintering birds.
4. To analyze causes of mortality of resident birds.

Status:

Project completed. Abstract of thesis follows:

ABSTRACT

The population of Great Blue Herons on Silver Creek in Idaho was studied intensively from May 1977 to August 1978. In both nesting seasons, the first eggs were laid in late March and the first young hatched in the third week of April. Most young had fledged and left the heronry by the second week of July.

Nineteen nests were active in 1977, of which 14 fledged 47 young. In 1978, 25 nests were active with only five fledging 13 young. In both years, successful nests produced somewhat larger broods than those observed by other authors in colonies elsewhere. No significant differences were detected in nest success or brood size between nests with central and peripheral locations in the colony. The high nestling mortality in 1978 was probably due to disease or parasites, rather than starvation, predation, or human disturbance.

The Silver Creek nesting colony has been in existence for at least 40 years and apparently has remained relatively stable in numbers. Peak numbers of Great Blue Herons in the valley occured during the nesting season, with a general dispersal observed after nesting. In the fall, groups of migrating herons were observed in the valley. Winter population counts fluctuated between 1 and 14 birds. Yearling birds were seen occasionally during the year.

Most observations of feeding herons were made in the tributaries.

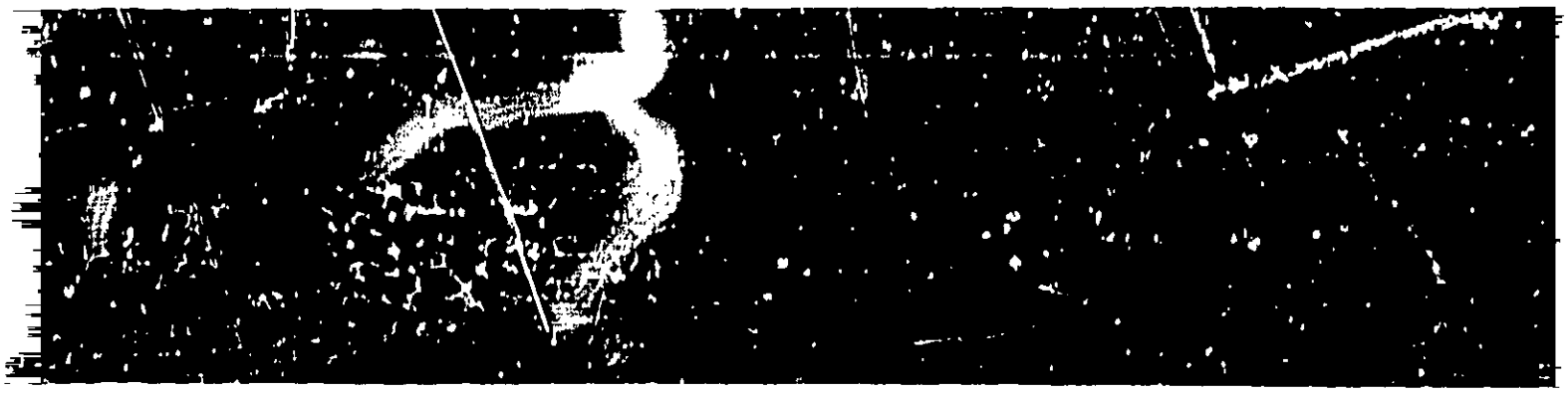
Loving Creek and the Silver Creek Preserve received regular use as standing-grounds during the fall and winter months. The majority of observations (78%) were made in riparian zones, although groups of herons often used upland sites for resting.

Regurgitated pellets and fish remains were collected at the heronry. The pellets were composed primarily of small mammal fur (61% in 1977, 96% in 1978). The average length of fish prey was estimated to be 245mm (9.6 in.) in 1977 and 224mm (8.8 in.) in 1978. The sample was believed to over-represent large prey items. Sixty percent of identified fish remains were rainbow trout or brook trout, with 14 percent mountain witefish and 26 percent nongame species.

Groups of herons were seen in every month of the year. Group sizes ranged from 2 to 34, with the largest average sizes observed in February, September, and October. Group size did not vary significantly at different times of the day, but more groups were seen during morning and mid-day than the evening. Feeding herons were always solitary and were occasionally observed to drive away intruding birds.

The selective advantage of colonial nesting was unclear. No evidence was found for the suggested advantages of social stimulation, predator defense, information about food locations, or use of limited nesting sites.

* * * * * * * * * *



Project WU-115: Analysis of predator-prey interactions on the Salmon Tract, Twin Falls County, Idaho

Investigator: Michael C. Todd

Advisor: Maurice G. Hornocker

Summer Assistant: Rick Myers

Project Support: U.S.D.I. Bureau of Reclamation; Idaho Department of Fish and Game

Objectives:

1. Measure badger abundance and activity within various cover types.
2. Describe the sex ratio, age structure, natality, and mortality of the badger population.
3. Delimit badger home ranges, movement patterns, and distribution.
4. Analyze badger food habits.
5. Inventory raptorial species.
6. Determine relative abundance of coyotes and other carnivorous species.

Progress:

Badger Captures

For the period of March-June 1979, a total of 758 trap nights resulted in the capture of 43 new badgers and 23 recaptures; 6 young of the year (YOY) badgers were captured by hand. Of the 23 recaptures, 8 of them were animals that had been trapped during the 1978 field season. Also, animals tagged in 1978 were collected from local residents. Eleven new adult males and 6 new adult females were captured during this period; young of the year sex ratios were 12 males and 17 females.

Twelve of 16 adult or yearling females (75%) showed signs of recent lactation from blackening and hair slippage on the teats. Average litter size as computed from 7 family units was 3.57. Trapping at maternal dens is continued until we are certain all young have been accounted for.

Carcass Collections

Seventeen badger carcasses were collected during this reporting period. Eight were adult males, 4 adult females, 2 YOY females and 2 YOY males; one adult carcass was too decomposed to determine its sex. Three of these 17 carcasses (17.6%) were animals that had been tagged in 1978. A YOY female had moved less than 0.35 mi before she was evidently caught in an alfalfa swather. Two adult males had moved approximately 5.25 and 8.75 miles from

point of release to where they were shot by local residents. Ten of the 17 carcasses collected (59%) were killed by local residents; other causes of mortality included 3 road-kills, 1 drowning, 1 sacrifice and 1 unknown.

Habitat Use

Badgers exhibited a high degree of use of cover types of annual grasses and forbs; these stands consisted chiefly of cheat grass (Bromus tectorum) and wild mustards (Sisymbrium altissum, Lepidium perfoliatum, and Descurainia sp.). Thirty-six of 72 captures/recaptures (36%) were in such cover types; 16 animals (22%) were captured in alfalfa fields (Medicago sp.). Badgers were also trapped in stands of crested wheatgrass (Agropyron cristatum), big sagebrush (Artimesia tridentata) and rabbitbrush (Chrysothamnus sp.).

Food Habits

Badger food habits were determined from analysis of 105 scats and 12 stomach samples collected in 1978. Belding's ground squirrels (Spermophilus beldingi) occurred in 75% of both scat and stomach samples. Small mammals and leporids were eaten less frequently; badgers also preyed upon snakes, insects and ground nesting birds.

Raptors

Raptor census routes were run over the study area from March through June; Table 1 lists the results of these censuses. Swainson's hawks (Buteo swainsoni) are the most common raptors nesting on the Salmon Tract; a total of 23 breeding pairs has been discovered. Other pairs of breeding birds of prey included 4 great horned owl (Bubo virginianus), 4 ferruginous hawk (Buteo regalis), 6 raven (Coruus corax), 9 burrowing owl (Speotyto canicularia), and 3 common crow (Cornus brachyrhynchos).

Plans for Next Six Months

1. Finish all aspects of field work.

2. Begin thesis preparation.

* * * * * * * * * *

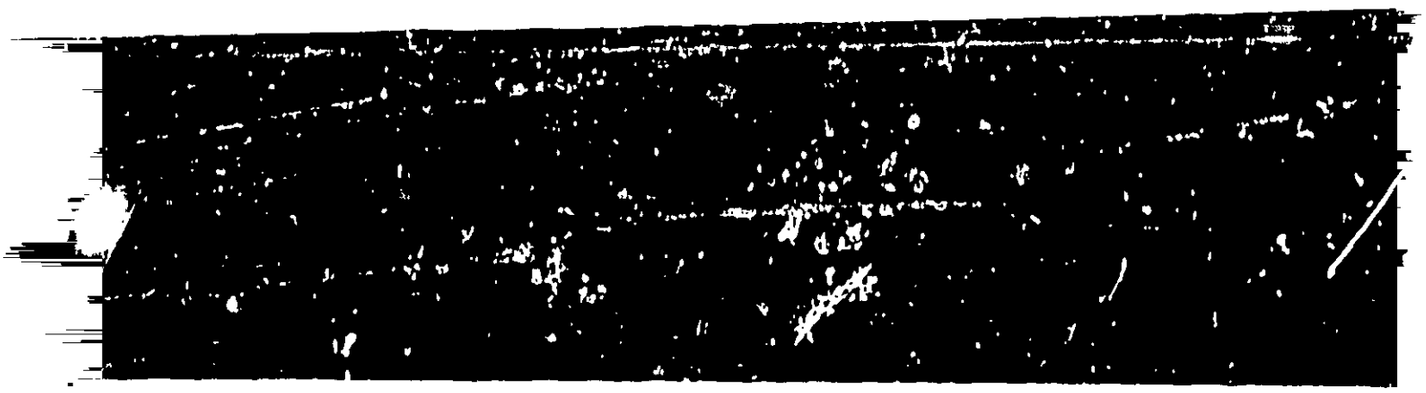
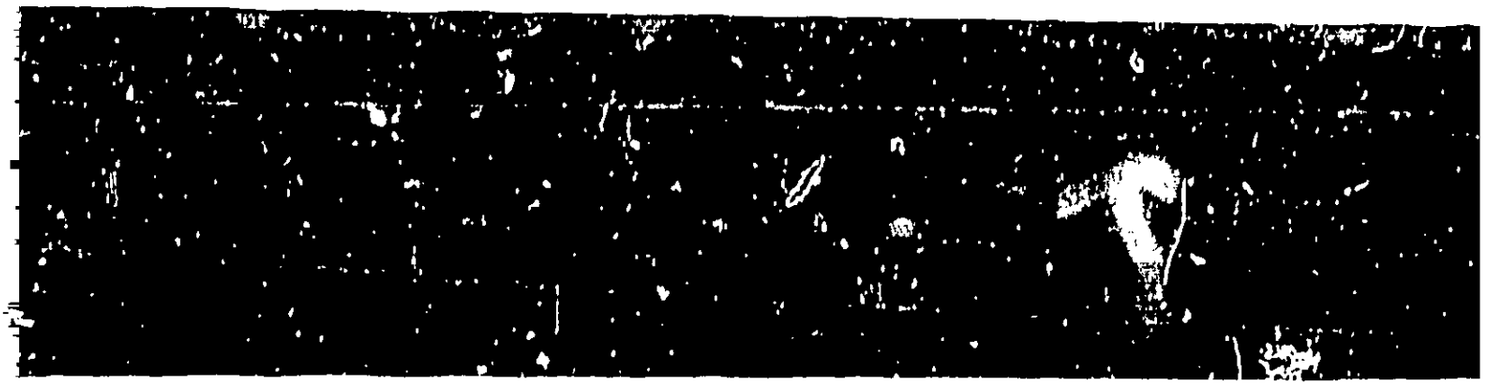


Table 1. Raptor road census results.

Species	22 Mar	22 Apr	26 May	28 June	Total
American kestrel	4	8	9	8	29
Rough-legged hawk	8	0	0	0	8
Red-tailed hawk	2	0	3	0	5
Swainson's hawk	0	6	8	5	19
Ferruginous hawk	0	1	0	0	1
Marsh hawk	9	2	3	5	19
Golden eagle	0	0	2	1	3
Short-eared owl	0	0	1	0	1
Barn owl	1	0	0	0	1
Raven	18	10	19	31	78
Magpie	12	14	13	29	68
Crow	0	2	0	3	5
Turkey vulture	0	0	3	?	5
Prairie falcon	0	2	0	0	2
Unidentified buteo	1	1	1	0	3



Project WU-117: Movement Patterns and Determinants of Habitat Use for Mule and White-tailed Deer in Northern Idaho

Investigator: Thomas E. Owens

Summer Assistant: Tim Meyers, Jayne Young

Advisor: James M. Peek

Project Support: McIntire-Stennis

Objectives:

1. Determine environmental parameters which significantly affect deer habitat selection.
2. Predict habitat selection patterns from parameters which affect deer habitat use.
3. Determine movement patterns of deer.

Progress:

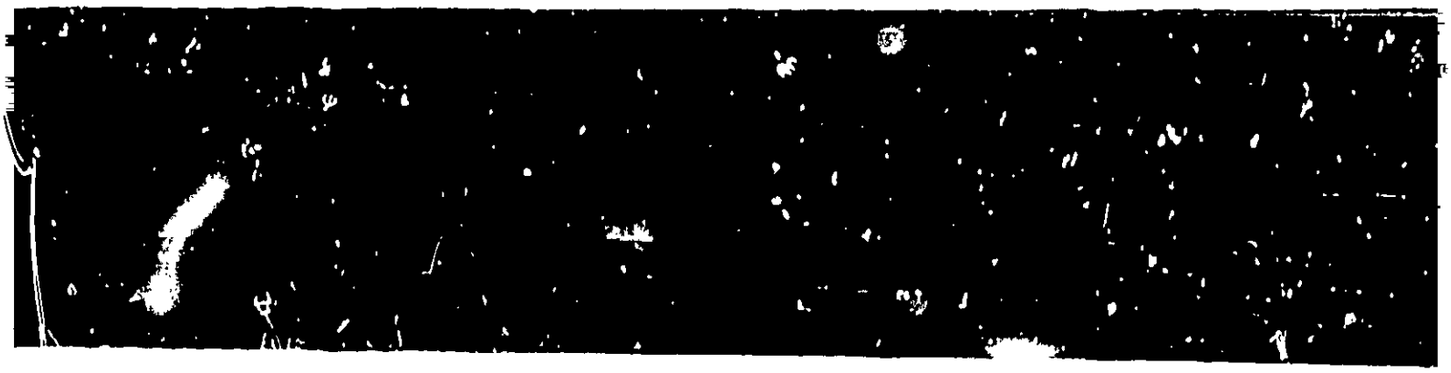
Seven white-tailed deer were captured and fitted with radio collars during the six-month period. Subsequent radiotracking efforts have yielded 161 useable radio locations for habitat analysis. Due to natural winter mortality, collar loss by fawns, collar malfunction and/or deer movements exceeding an 80 km radius from study area, only 2 deer are currently being radiotracked. During June, summer field assistants performed habitat analysis on 120 radio locations, thus completing analysis of previous years' radio locations.

Weather data were collected from eight stations to investigate microclimate differences between various topographic positions and aspects.

Plans for Next Six Months:

Weather stations, and the remaining radio-collared deer will be monitored and habitat analysis of radio locations continued.

* * * * * * * * * * *



WII-118 Wood Duck Nesting Ecology

Investigator: Joe Miles

Summer Assistant: Brad Dingee

Advisor: Elwood G. Bizeau

Project Support: Idaho Department of Fish and Game

Overall Goal: To develop a transplant program for wild wood duck hens and ducklings which can be efficiently utilized by state and federal wildlife agencies.

Objectives: The primary objectives of this phase of the project are:

1. Estimate the mean length of incubation for wood ducks on the Coeur d'Alene Wildlife Management Area.

2. Develop techniques which will enable field workers to accurately predict the hatching dates of wood duck clutches.

3. Test the hypothesis that disturbance does not increase the length of the incubation period for wood ducks.

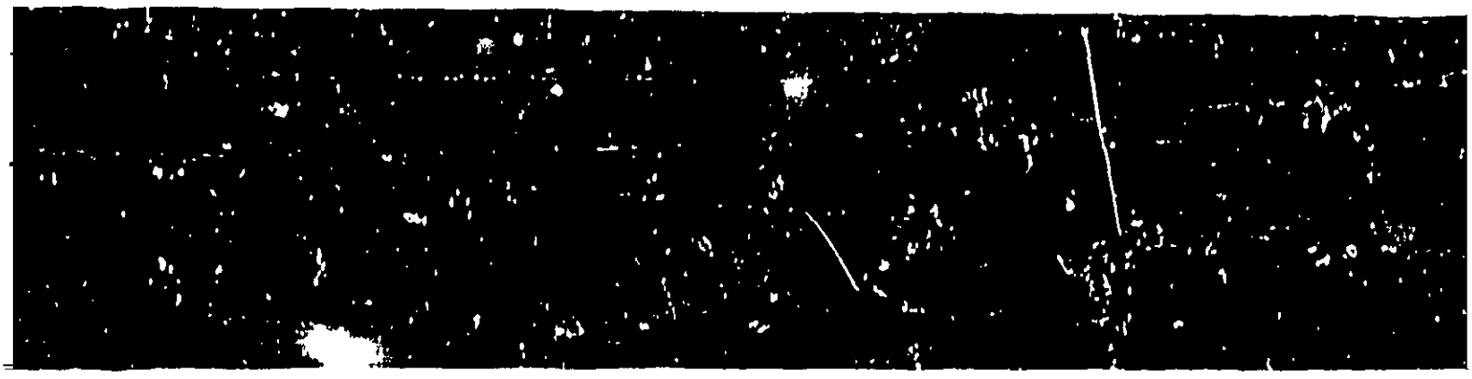
Progress:

Field work began on April 5th and will continue through mid-July.

Data on weight loss, specific gravity, diameter of air cell, and two floatation measurements were obtained from 6 clutches (72 eggs). Four of the clutches (38 eggs) were incubated in a Rollex automatic incubator. Two of the clutches (34 eggs) were incubated in the field by wood duck hens and monitored by Rustrak recorders; one field-incubated clutch was abandoned on the 24th day of incubation.

Six Rustrak recorders were installed to evaluate the effect of disturbance upon the length of the incubation period in the field. A complete record of incubation temperatures and nest attentiveness was obtained from 2 recorders and a partial record from 4 recorders. Ten additional eggs were collected and placed in the Rollex incubator to evaluate the effect of disturbance on incubation length under controlled contions.

A total of 140 day-old ducklings was transplanted from the Coeur d'Alene Wildlife Management Area to 3 release sites in north Idaho.



Plans for the Next Six Months:

1. Participate in Canadian duck banding operation 1 August - 10 September.
2. Analyze data collected during the 1979 field season.
3. Course work.

* * * * * * * * * * *

Project WU-119 — A Winter Survey of Threatened, Endangered and Status Undetermined Mammals in North Idaho

Investigator: Gary M. Koehler

Supervision: Maurice G. Hornocker

Project Support: U.S. Fish and Wildlife Service

Objectives:

Determine presence, population status and distribution of the timber wolf, wolverine, Canada lynx, bobcat, river otter, fisher and pine marten in north Idaho

Results

The survey was completed by April 30, 1979. Following is summary of the final report.

SUMMARY

The survey was conducted during the period January-April, 1979. Snow tracking and direct observation were the primary means of obtaining data. Additional data were obtained on animal locations and numbers from persons familiar with the study area.

A total of 681.5 miles of roads and trails was surveyed. This represents a total effort of 82 man-days of field work and 6786 total miles of travel by vehicle, snowmobile, and skiis. Sixty-two persons were interviewed during the survey.

Several species considered Status Undetermined by the Department of Interior are common in north Idaho. Marten are abundant in all mountainous areas. At one time the wolverine was considered rare; reports now indicate they are becoming more common throughout the mountainous regions. Fisher, also considered rare 30 years ago, are now becoming common in northcentral Idaho where they were reintroduced by the Idaho Department of Fish and Game in 1962. Reports of lynx occur throughout northern Idaho, but nowhere are they considered common. Two species under consideration by the Convention of International Trade in Endangered Flora and Fauna, the otter and bobcat, are common in north Idaho. Wolves are rare with observations documented only for the Clearwater River drainage of northcentral Idaho.

* * * * * * * * * *

Project WU-120: Ecology of the mink (Mustela vison) in west-Central Idaho

Investigator: Jackson S. Whitman

Assistants (Seasonal): Joan Antle and Randy Olson

Advisor: Maurice Hornocker

Project Support: U.S. Fish and Wildlife Service, Idaho Department of Fish and Game, University of Idaho

Objectives:

1. To describe mink population density, sex and age structure, reproduction and mortality rates.
2. To describe daily and seasonal activity patterns.
3. To describe food habits of mink throughout the year.
4. To evaluate the effects of various human activities on mink distribution and survival.

Justification:

Although the mink is a valuable wild furbearer and the subject of extensive fur-ranching endeavors, little intensive, ecological research has been conducted on wild mink populations. Historically, wild mink have been the object of intensive trapping efforts. This heavy exploitation has not decimated populations. The mink occurs in 48 states and all 11 Canadian Provinces and Territories. There exists a wealth of information on mink dealing with fur-farming, but little data concerning certain ecological aspects. This research is designed to explore those characteristics of which little is known. The conservation of wild furbearers depends on our ability to manage and preserve existing populations.

The Study Area

The study area encompasses approximately 404 km^2 of the upper North Fork of the Payette River drainage in west-central Idaho. The long, narrow valley ranges from 1500-2000m, from south to north. Midway through the valley, Lake Fork Creek enters and parallels the Payette River, eventually joining the river near the southern end of the study area. Both rivers are fed by mountain lakes and creeks. Three major natural lakes are within the study area, and the southern end is bounded by Cascade Reservoir.

Intensive trapping and radiotracking are conducted on the central portion of the study area along a 13.5 km portion of the Payette River. This sector of the river has a relatively low gradient, is often meandering and contains numerous sloughs and backwaters. It receives heavy

snowfalls in winter and has moderately-dry summers. Riparian vegetation, consisting of numerous shrub and forb species, is moderate to dense along the stream banks. The overstory community is primarily dominated by lodgepole pine (Pinus contorta) and ponderosa pine (Pinus ponderosa).

Methods and Materials

Mink are live-trapped using Tomahawk live traps (National Live Trap Company, Tomahawk, WI) and barrel traps. Traps are placed along stream banks and baited with fresh fish. Runway or "cubby-hole" sets are used where appropriate. Traps are checked daily and rebaited as necessary. Mink are drugged with Ketamine hydrochloride, measured, tagged and released after recovery. Selected individuals are fitted with transmitters. Telemetry, the occurrence of sign, and capture/recapture data provide information on density, sex and age, breeding age, reproduction, mortality rates, and daily and seasonal movements. Carcasses of tagged mink collected from commercial fur trappers during the trapping season provide a record of long-range mink movements.

Mink scats are collected and categorized by specific location and date of deposition. A binocular dissecting scope is used for examination of macroscopic prey remains. These remains are compared with a reference collection for positive identification. A compound microscope is used to examine mammal hairs and fish scales.

Mammals, fishes, avians, and herptiles (reptiles and amphibians) are considered in food habits analysis. Insects are frequently encountered, but I feel that their importance in the diet is minimal, when their total biomass is considered. Vegetation and sand are often incorporated in the scats, but these items are believed to be ingested incidentally while consuming the prey item.

Progress:

Trapping. A total of 800 trap-days for this reporting period has resulted in 33 mink captures (24 trap-days/capture) (Table 1). Since August 1977 when mink trapping and tagging began, 63 mink have been captured a total of 166 times.

Winter and early spring trapping efforts indicate that mink are susceptible to baiting at this time. Late spring and early summer periods are often hampered by fluctuating water levels in the trapping areas. At this time, mink often ignored baited traps.

Movements based on Telemetry. Movements and activity patterns of mink are being determined by the use of telemetry. All mink instrumented thus far have been fitted with collar-type transmitters. During this reporting period, four mink have been instrumented. Malfunctions occurred in the transmitters initially. They were subsequently removed from three of the mink and returned to the manufacturer for repair (Wildlife Materials, Inc., Carbondale, Ill.).

On 30 May, M138 was captured, instrumented and released. Movement and activity data were collected daily until 9 June, when the animal was suspected to be dead. On 15 June, M138 was found dead with the transmitter still functioning. An autopsy revealed that this animal had died several days earlier from a severe blow to the head which crushed the skull. The cause is unknown.

On 8 June, another adult male (M140) was captured and instrumented. Daily locations were recorded until 30 June when the transmitter malfunctioned. Both this individual and M138 displayed no specific patterns of activity. Both diurnal and nocturnal activity periods were recorded.

M140 consistently used about 4 straight-line km of river. Movements were confined to within several meters of the river and overlapped the range used by M138. Another adult male mink, M144, was captured in the same area indicating an overlap in ranges by adult male mink.

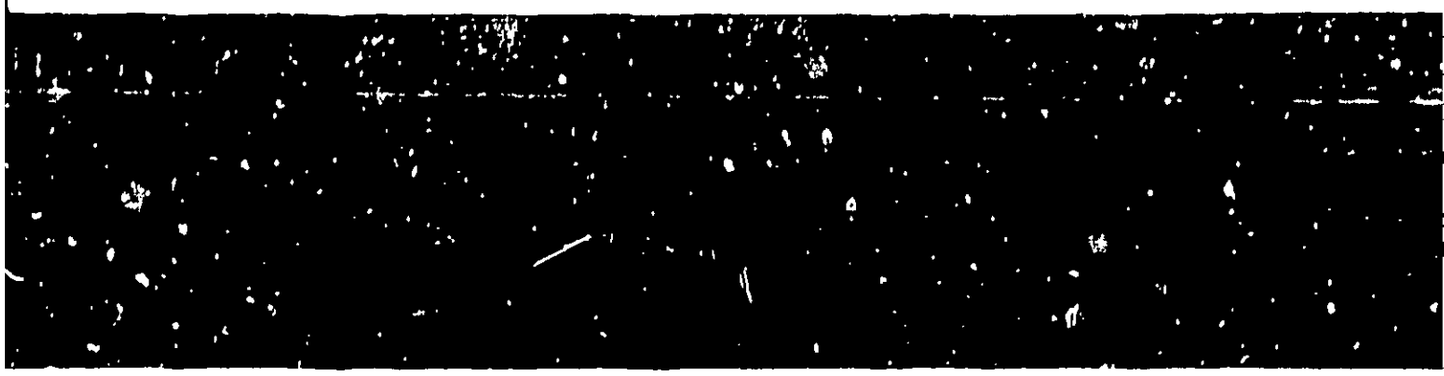
To date, telemetry has provided movement and activity data on 13 individual mink. Although problems with the transmitters have limited their effectiveness, telemetry has provided valuable information to supplement live-trapping.

Food Habits. To date, 539 mink scats have been collected. Two hundred of these were collected during this reporting period and have not been analysed. Several mink latrines have been located, facilitating most of the collections. Single scats are often found, adding to the collections. Mink scats are often difficult to obtain, especially during winter when frequent snowfalls cover them.

Thus far, 339 scats have been analysed. These scats were collected incidental to otter scat collections during the field seasons of 1976, 1977, and 1978 (see otter project reports). Table 2 presents the breakdown, by season, of scats collected during those years. The summer months are best for locating scats. In winter, snow often covers the scats soon after deposition and fluctuating water levels in spring result in many scats being washed away.

At least 13 species of mammals contribute 34 percent (frequency of occurrence) of the prey ingested (Table 3). Meadow mice (Microtus montanus) occurred in 16 percent of the scats, constituting the highest single species consumed.

Of the major groups of prey consumed, fishes comprised the largest single group. However, when total biomass is considered, mammalian prey is decidely more important than fishes, as small fish such as sculpins (Cottidae) minnows (Cyprinidae, and small trouts (Salmonidae) are the major groups represented. It is apparent from this study and others in North America that mink consume a wide variety of prey species. Their feeding habits appear to be related to prey availability.



Plans for Next Six Months:

1. Continue live-trapping and marking efforts within the intensive study area.

2. Instrument at least 4 additional mink and continue monitoring their movements.

3. Continue scat collections and analysis.

4. Contact fur trappers to collect mink carcasses for data on age, sex and density characteristics of the population.

* * * * * * * * * * *

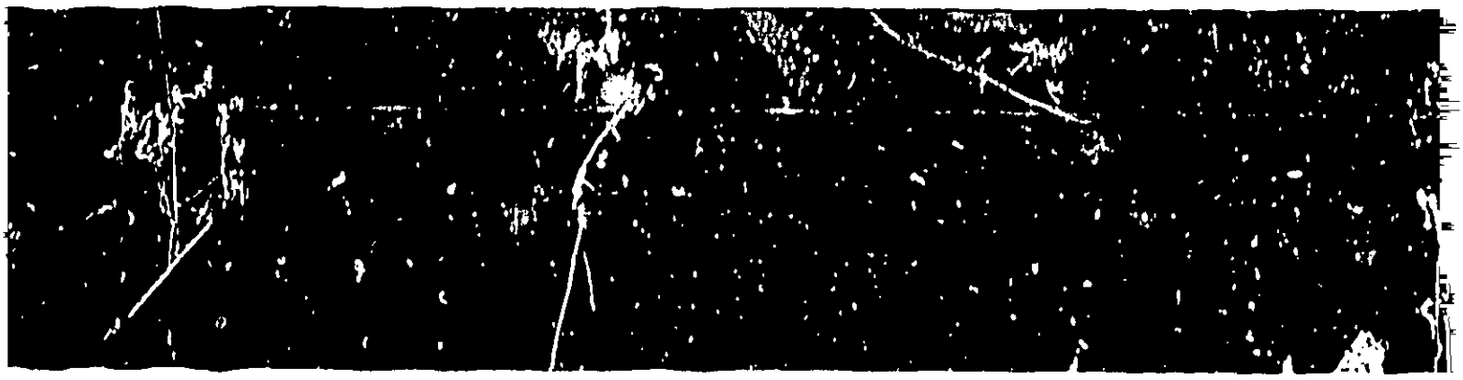


Table 1. Mink trap-days and captures for the period January through June 1979.

Month	Tomahawk Traps		Barrel Traps		Total Traps	
	No. Set	Captures	No. Set	Captures	No. Set	Captures*
January	0	0	0	0	0	0
February	0	0	0	0	0	0
March	79	3	9	0	88	3(2)
April	116	12	108	10	224	22(6)
May	21	2	63	0	84	2(2)
June	249	8	155	0	404	6(4)
Totals	465	25	335	10	800	33(8)

*The number before the parentheses represents the total captures, including recaptures. The number in parentheses is the number of individual mink captured.

Table 2. Mink scat collections from 1976 through 1978 from the North Fork of the Payette River and Lake Fork Creek, west-central Idaho.

Year	Season*				Total
	Spring	Summer	Fall	Winter	
1976	0	18	19	3	40
1977	3	33	5	1	42
1978	6	204	47	0	257
Totals	9	255	71	4	339

*Based on phenological events in the study area, the seasons are defined as follows: Spring, 16 April-30 June; Summer, 1 July-15 September; Fall, 16 September-15 November; Winter, 16 November-15 April.

Table 3. Prey remains in 339 mink scats collected June 1976 through December 1978 in west-central Idaho.

	Prey Items				
	1976	1977	1978	Total No. of prey items	% of total prey items
Mammals					
Microtus montanus	18	6	34	58	16.2
Ondatra zibethicus	2	0	19	21	5.9
Peromyscus maniculatus	2	2	16	20	5.6
Zapus princeps	3	0	1	4	1.1
Eutamias spp.	1	0	3	4	1.1
Sorex spp.	0	0	4	4	1.1
Others (7 species)	3	0	5	8	2.2
Unidentified rodents	0	0	3	3	.84
Total mammals	92	8	85	122	33.98
Fishes					
Cyprinidae	11	16	21	48	13.4
Salmonidae	4	5	22	31	8.6
Cottidae	5	16	7	28	7.8
Percidae	0	0	1	1	.3
Unknown fish	4	10	28	42	11.7
Total fishes	24	47	79	150	41.8
Avians					
Duck	1	4	29	34	9.5
Spotted sandpiper	1	0	0	1	.3
Brewer's blackbird	0	0	1	1	.3
Unknown small bird	5	5	28	38	10.6
Unknown bird egg	0	0	3	3	.8
Total avians	7	9	61	77	21.5
Herptiles					
Garter snake	1	2	6	9	2.5
Spotted frog	0	1	0	1	.3
Total herptiles	1	3	6	10	2.8
TOTAL	61	67	231	359	100.0

MISCELLANEOUS

January

11 — Drewien gave presentation on the whooping crane foster-parent research to the annual meeting of the Whooping Crane Conservation Association at Rockport, TX. 100 attendees.

12 — Hornocker and Melquist gave papers on "Mountain Lions and Wilderness" and "Status of the River Otter in Idaho" and Peek chaired session on "Big Game and Wilderness" at Idaho Chapter TWS meeting in Boise, ID. 100 attendees.

18 — Peek gave paper on "Elk-Road Interactions" at Colorado State University Workshop at Fort Collins, CO. 50 attendees.

24 — Drewien gave talk on whooping crane foster-parent research to New Mexico State University Chapter, TWS at Las Cruces, NM. 75 attendees.

Jan. 23-26, Feb. 13-16 and Mar. 13-16 — Bizeau served on Pacific Flyway Management Plan Committees for Rocky Mountain Greater Sandhill Cranes and Rocky Mountain Canada Goose at Salishan, OR and Reno, NV. 10 to 15 participants.

30-31 — Bizeau participated in Civil Service Commission Communications Workshop at Seattle, WA. 15 participants.

February

6 — Drewien gave talk on whooping crane foster-parent research to Presbyterian Church group at Belen, NM. 60 attendees.

8 — Drewien presented illustrated lectures on whooping crane foster-parent project to Ft. Collins Audubon Chapter (600 attendees) and to faculty and graduate students of the Wildlife Department at Colorado State University, Ft. Collins, CO. 80 attendees.

13-15 — Melquist won the Northwest Section Best Paper presentation titled "Ecology of River Otter in west-central Idaho" and Nelson moderated session on "Public Needs and Demands" at Northwest Section The Wildlife Society Conference, Portland, OR. 180 attendees at conference.

16 — Nelson attended Idaho Wildlife Federation Annual Meeting. Twin Falls, ID. 100 attendees.

15	Krohn gave paper [illegible] Migration of the Rocky Mountain Population of the [illegible] Canada Goose" at Pacific Flyway Goose Symposium, [illegible]and, OR 100 attendees.
21	Drewien gave talk on whooping crane foster-parent research to Mesilla Valley Audubon Chapter at Las Cruces, NM. 75 attendees.

March

1	Hornocker delivered guest lectures on wildlife research at University of Wyoming, Laramie, WY. 150 attendees
1 March to 20 June	Peek served at 8 periodic meetings of Range Stewardship Committee to establish BLM range management plans, Challis, ID. 30 participants.
6	Peek gave presentation on elk habitat use at Interagency Biologists Meeting. Boise, ID. 150 attendees.
6-8	Bizeau participated in Area Meeting, USFWS, Portland, OR. 30 attendees.
12-16	Peek attended Moose conference at Kenai, AK. 100 attendees.
23	Todd gave presentation on the Salmon Tract badger study to Lincoln Elementary School at Twin Falls, ID.
29	Bizeau was banquet speaker for Western States Student Wildlife Conclave, Moscow, ID. 120 attendees

April

5	Hornocker gave series of guest lectures to classes and meetings at University of Montana. Missoula, MT. 100 to 200 attendees.
17-18	Bizeau represented Units located in Pacific Northwest at OBS workshop in Portland, OR. 20 attendees.
25	Hornocker delivered guest lecture on wildlife research at Treasure Valley Community College. Ontario, OR. 100 attendees.
25-26	Nelson gave presentation on "Continuing Education in Wildlife" to annual meeting of Idaho Department of Fish and Game Conservation Officers at Boise, ID. 70 attendees.
26	Joint Annual Wildlife and Fisheries Units Coordinating Committee meeting. Dr. B. Griswold represented Washington office. Moscow, ID. 9 attendees.

May

4 Drewien gave talk on whooping crane research to Cincinnati Museum of Natural History group at Grays Lake NWR, Wayan, ID. 30 attendees.

10 Drewien gave illustrated talk on the whooping crane research to Bridgerland Audubon Chapter at Logan, UT. 250 attendees.

12 Peek gave presentation on "Elk and Elk Hunting" to public meeting at Elk City, ID. 30 attendees.

16 Bizeau gave guest lecture to Wildlife class at Washington State University. Pullman, WA. 100 attendees.

June

30 Hornocker and Drewien presented illustrated talks on "Mountain Lions and Wolverines in Wilderness Ecosystems" and "Establishing New Flocks of Whooping Cranes" at National Audubon Society Biennial Convention. Estes Park, CO.

* * * * * * * * * * *